Department of the Army

Program Manager for

Chemical Demilitarization

Aberdeen Proving Ground, Maryland

Chemical Stockpile Disposal Project

Programmatic Process
Functional Analysis Workbook (FAWB)

Book 29

Brine Reduction Area

BRA

Revision 0 *Change 1*

August 26, 2003

NOTE: The BRA programmatic process FAWB applies to ANCDF, PBCDF, TOCDF and UMCDF.

ALL FAWB SYSTEMS

Book (Chapter[1])	System Identifier	FAWB Title
UTILITY SYSTEMS (Site-specific)		
1 (5.15)	NGLPG	Fuel Gas System (Natural Gas and Liquefied Petroleum Gas)
2 (5.14)	HYPU	Hydraulic Power Unit and Distribution System
3 (5.19)	BCS	Bulk Chemical Storage System
4 (5.16)	CAS	Compressed Air Systems (Plant, Instrument, and Life Support)
5 (5.22)	SGS	Steam Generation System
6 (5.26)	DMS	Door Monitoring System
7 (5.28)	PCS	Primary Cooling Systems
8 (5.12)	EPS	Electrical Distribution and Emergency Power System
9 (5.13)	—	(HVAC FAWB moved to Book 20 (Process Systems))
10 (5.17)	WATER	Water Systems (Process Water, Potable Water, and Water Treatment Systems)
11 (5.21)	CDSS	Central Decon Supply System
12 (5.18)	TSHS	Toxic Storage and Handling Systems (Agent Collection, Spent Decon, and Sumps)
13 (5.20)	ACSWS	Acid and Caustic Storage and Wash System (DELETED[2])
14 (5.27)	FDSS	Fire Detection and Suppression System
15 -19	—	(not assigned; reserved for future use)
PROCESS SYSTEMS (Programmatic)		
20	HVAC	Heating, Ventilation, and Air Conditioning System
21	RHS	Rocket Handling System
22	PHS	Projectile Handling System
23	MHS	Mine Handling System
24	BCHS	Bulk Container Handling System
25	DFS	Deactivation Furnace System
26	LIC	Liquid Incineration System
27	MPF	Metal Parts Furnace System
28[3]	PAS/PFS	DFS, LIC and MPF Pollution Abatement System and PAS Filter System
29	BRA	Brine Reduction Area and BRA PAS
30	CHB	Container Handling Building
31	ACAMS	Automatic Continuous Air Monitoring System
32	TCE	Treaty Compliance Equipment
33[4]	DUN	Dunnage Incineration System and DUN PAS
34[3]	PFS	LIC, DFS, and MPF PAS Filter Systems (DRAFT only)

[1] TOCDF has original "chapter" numbers for utility system FAWBs.

[2] The ACSWS FAWB was deleted.

[3] The PAS and PFS FAWBs were combined into a single PAS/PFS FAWB (Book 28).

[4] A DUN FAWB is not being developed per direction of PMCSD on 9-10-98.

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REVISION LOG

REV.#	PAGE(S)	REFERENCE AND DESCRIPTION OF CHANGE
0	NA	Initial Issue
0CH1	*Appendix C*	*Inserted revised UMCDF BRA A&I matrices per ECP UMSF1212BRA.*

SECTION 1
INTRODUCTION

1.1 CSD PROJECT BASELINE TECHNOLOGY OVERVIEW

The Office of the Project Manager for Chemical Stockpile Disposal (PMCSD) is responsible for the disposal of the United States' existing unitary chemical weapon stockpile. PMCSD manages execution of the design, construction, equipment acquisition/installation, systemization, plant operations, and closure of all CSD project sites.

The CSD project baseline technology consists of the following:

- mechanical disassembly or puncturing the munitions to remove chemical agent and any explosives or propellant,
- incineration of the chemical agent and any explosives and propellant, and
- thermal detoxification of metal parts and any contaminated dunnage.

This technology was demonstrated during a series of operational verification testing (OVT) campaigns at the Johnston Atoll Chemical Agent Disposal System (JACADS). JACADS represented the first generation of a full-scale facility implementation of the project baseline technology. JACADS completed disposal of the chemical agent and munitions stockpiled at Johnston Atoll in November, 2000.

The second generation plants implementing the baseline technology include the following:

- Tooele Chemical Agent Disposal Facility (TOCDF), located at the Deseret Chemical Depot in Tooele, Utah;
- Anniston Chemical Agent Disposal Facility (ANCDF), located at the Anniston Army Depot near Anniston, Alabama;
- Umatilla Chemical Agent Disposal Facility (UMCDF), located at the Umatilla Chemical Depot near Hermiston, Oregon; and,
- Pine Bluff Chemical Agent Disposal Facility (PBCDF), located at the Pine Bluff Arsenal near Pine Bluff, Arkansas.

Unless otherwise noted, the programmatic functional analysis workbooks (FAWBs) for process systems apply to each of these CSD sites.

1.2 BACKGROUND

FAWBs for 25 plant systems were issued for JACADS in January 1985 by The Ralph M. Parsons Company (now the Parsons Infrastructure & Technology Group, Inc.). Parsons is the Design and Systems Integration Contractor (DSIC) for the CSD project. The FAWBs provided the basis for the facility control system's programmable logic

controller (PLC) and computer systems programming. The JACADS FAWBs were later revised by United Engineers & Constructors and, by the July 1989 issue, two additional systems had been added.

FAWBs for TOCDF were issued in April 1993 by Parsons. There were 28 plant systems defined for TOCDF; however, only 27 FAWBs were issued (The Residue Handling Area FAWB was not issued). Most of the TOCDF plant systems were the same as those for JACADS; however, there were some differences due to different plant configurations, system consolidations, and the inclusion of additional systems. The TOCDF systems contractor (SC) received the FAWBs and assumed responsibility for maintaining the set current with the TOCDF plant configuration and the evolution of its operational strategy. Utility system FAWBs also were developed for ANCDF, PBCDF and UMCDF. Their purpose is to assist the sites during utility systems equipment procurement, and to describe their use in facility operation. Utility system FAWBs are more site-specific, consist primarily of SC-procured equipment, and will be maintained by the individual demilitarization sites.

In September 1997, PMCSD began the development of programmatic process FAWBs for process systems common to all sites, eliminating the need to maintain separate process FAWBs at each site. Having a single set of process FAWBs provides a means to ensure operational consistency between the sites and to accurately record differences between the demil facilities. The programmatic process FAWBs serve as an invaluable training tool for the Systems Contractor for Training (SCT) to ensure consistent training on process systems for all sites, and to quickly identify site-specific training requirements.

1.3 PROGRAMMATIC PROCESS FAWB SYSTEMS

Sixteen process systems having minimal differences between sites were designated as programmatic systems. These programmatic process FAWBs are maintained as a single reference rather than at each site. Minor site configuration differences between the sites are highlighted in the FAWB discussions and tables. Fourteen of these 16 systems were included in the 28 original plant system FAWBs developed by the DSIC. For conciseness, the dunnage incinerator (DUN) and DUN pollution abatement system (PAS) FAWBs were to be combined into a single FAWB, for a total of 15 programmatic process FAWBs. However, development of a programmatic FAWB for the DUN and DUN PAS was suspended indefinitely at the direction of the PMCSD Operations Team (see FAWB Note B-1). In addition, FAWBs for the wet PAS and the PAS filter system (PFS) were combined into a single FAWB (see FAWB Note B-2). Therefore, a total of 13 programmatic FAWBs were developed for the process systems. The heating, ventilating, and air-conditioning (HVAC) FAWB originally was included as one of the utility system FAWBs produced for ANCDF in 1996 (HVAC FAWB was Book 9 for ANCDF Utility FAWBs). It has been recategorized as a process system and is included in the set of programmatic process FAWBs.

The programmatic process FAWBs are numbered in accordance with the convention established during production of the ANCDF and UMCDF utility system FAWBs. This convention reserves book numbers 1 through 19 for utility systems, and book numbers 20 through 34 for the process FAWBs. Programmatic process FAWB book numbers and

titles are listed in Table 1.1. The original TOCDF FAWB chapter numbers are shown for reference.

Twelve of the 28 original plant system FAWBs are designated as site-specific utility systems. For these systems, the SC is delivered an initial utility FAWB indicating the system design configuration and operational strategy. The SC maintains the utility FAWBs to reflect the site-specific configuration. The utility FAWBs are listed in Table 1.2; original TOCDF FAWB chapter numbers are shown for reference.

The two remaining systems of the 28 originally planned plant system FAWBs are the acid and caustic storage and wash system (ACSWS) (5.20) and the residue handling area (5.24). The ACSWS FAWB at TOCDF no longer is maintained and has not been developed for follow-on sites (see FAWB Note B-3). A FAWB for the residue handling area was not produced due to its lack of automatic control features.

Table 1.1 Programmatic Process FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
20	Munitions Demilitarization Building HVAC (5.13)
21	Rocket Handling System (5.1)
22	Projectile Handling System (5.2)
23	Mine Handling System (5.3)
24	Bulk Container Handling System (5.4)
25	Deactivation Furnace System (DFS) (5.5)
26	Liquid Incinerator (LIC) System (5.6)
27	Metal Parts Furnace (MPF) System (5.7)
28[1]	DFS, LIC, and MPF Pollution Abatement System and PAS Filter System (5.9)
29	Brine Reduction Area (BRA) and BRA PAS (5.23)
30	Container Handling Building (5.11)
31	Automatic Continuous Air Monitoring System (5.25)
32	Treaty Compliance Equipment (Not included in original FAWB)
33[2]	DUN System and DUN PAS (5.8 & 5.10)

[1] Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the draft programmatic process FAWBs for the PAS and PFS were combined into a single PAS/PFS FAWB, Book 28 (See FAWB Note B-2).

[2] As directed at the FAWB teleconference on 9-10-98, a programmatic process FAWB for the DUN/DUN PAS is not being developed (See FAWB Note B-1).

Table 1.2 Site-Specific Utility FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
1	Fuel Gas System (5.15)
2	Hydraulic Power Unit and Distribution System (5.14)
3	Bulk Chemical Storage System (5.19)
4	Compressed Air Systems (5.16)
5	Steam Generation System (5.22)
6	Door Monitoring System (5.26)
7	Primary Cooling System (5.28)
8	Electrical Distribution & Emergency Power System (5.12)
9	Not used; formerly HVAC
10	Water Systems (5.17)
11	Central Decon Supply System (5.21)
12	Toxic Storage and Handling Systems (5.18)
13	Not used; formerly acid and caustic storage and wash system
14	Fire Detection and Protection System (5.27)
15 - 19	Not assigned; reserved for future use

1.4 PROGRAMMATIC PROCESS FAWB PURPOSE

The programmatic process FAWBs serve as a repository for all control information for the automated aspects of the baseline technology demilitarization process systems. They serve as one of the source documents for PLC control system and computer system programming, operator training, and facility operation. These FAWBs also serve as programmatic reference documents that define how the process systems operate and capture the differences between facility operational configurations. Each programmatic process FAWB contains a subsection that defines the system boundaries and identifies the interfaces with other plant process and utility systems.

Programmatic process FAWBs are living documents, subject to configuration control under the CSD project Participant Quality Assurance Plan. They are meant to be continuously updated with user input whenever system modifications are made, or as needed to enhance the information presented. Programmatic process FAWB revisions are implemented as outlined in Section 1.6. The process by which the SCT maintains the programmatic process FAWBs and the roles and responsibilities of each organization affiliated with the CSD project are described in detail in the Programmatic Process FAWB Maintenance Plan.

Programmatic Process FAWB Limitations

Even though the FAWBs contain detailed descriptions of the configuration and control for each process system, they are not all-inclusive. Every effort is made to include the

level of detail necessary to fully describe the specific operating configuration for each process system. Each process FAWB includes supporting references to direct the user to relevant programmatic and site-specific documentation (e.g., standing operating procedures, drawings).

Because of the revision cycle time, there will be a slight lag time between recent changes and their reflection in the FAWB. Maintenance of the FAWBs will be done semiannually, or more frequently if needed, to reflect significant modifications.

The FAWB maintenance program relies heavily on input from each baseline technology demilitarization site. Timely and accurate input ensures that the FAWBs reflect the current configuration at each of the sites. All information received will be thoroughly reviewed to ensure consistent and accurate documentation.

As a programmatic document, the FAWBs describe the configuration and operation of four separate facilities. Care must be taken by the user to ensure that the information extracted from this document reflects the configuration for the facility of interest. Site-specific differences are highlighted in both the text and the appendices to avoid confusion.

1.5 PROGRAMMATIC PROCESS FAWB ORGANIZATION

The process FAWBs document the chemical demilitarization facility operations at ANCDF, PBCDF, TOCDF, and UMCDF. The format and structure of the programmatic process FAWBs differ from the original format prepared by the DSIC, and from the format previously maintained at TOCDF. The information from earlier versions has been retained and updated to reflect lessons learned from the design, construction, systemization, and operation of the demilitarization facilities, including JACADS and the Chemical Agent Munition Disposal System (CAMDS). The overall layout of the programmatic process FAWBs is shown in Table 1-3.

1.6 PROGRAMMATIC PROCESS FAWB REVISIONS

The programmatic process FAWBs are maintained by the SCT to reflect the operational and control system configuration at each CSD site that implements the baseline destruction technology. Each programmatic process FAWB will be reviewed and revised, as required, on a semiannual basis. Individual process FAWBs can be revised more frequently, if needed, to reflect significant configuration changes. Programmatic process FAWB modifications can be generated by the following:

- Engineering change proposals at any of the CSD sites
- CSD project programmatic lessons learned
- Operational modifications that do not involve configuration changes
- Programmatic changes
- Need for greater detail or clarification

The programmatic process FAWB maintenance plan identifies the organizations that participate in the FAWB maintenance program and the responsibilities of each to supply information that could result in revisions to the FAWB. All organizations are represented

on the FAWB Evolvement/Evaluation Team (FEET), and are involved with review of each FAWB revision to ensure that the site configuration and operating strategy is current.

Table 1.3 Organization of the Programmatic Process FAWBs

Section	Title	Contents
1	Introduction	General FAWB background, organization, and revision method
2	System Overview	Purpose of the system; operational and process design basis summary; system boundaries and interfaces
3	Process Description	Description of subsystems; control sequences
4	Component Summary	Tables listing parameters for primary components; power source listings
App. A	Acronyms and Abbreviations	
App. B	FAWB Notes	Notes that provide additional detail or background information
App. C	Alarm and Interlock Matrices	Programmatic matrices or matrices for each site
App. D	PLC Automatic Control Sequences	Automatic logic contained in the PLC code; burner management system automatic controls; sequencer logic for demil systems
App. E	Operator Screens	Advisor PC screens for each site
App. F	Instrument Ranges	Tables showing instrument ranges and setpoints
App. G	Intercontroller Communications	Tables listing the digital intercontroller inputs/outputs (DICIs/DICOs)
App. H	References	Listing of reference documents, including drawings, used to prepare and maintain the FAWB

SECTION 2
SYSTEM OVERVIEW

2.1 PURPOSE AND FUNCTION

The function of the brine reduction area (BRA) is to process brine from the pollution abatement systems (PASs) associated with the deactivation furnace system (DFS), metal parts furnace (MPF), liquid incinerators (LICs)[1], and dunnage incinerator (DUN) furnaces, and water softener regeneration waste (i.e., wastewater) from the water treatment system (WTS) [see FAWB Notes B-1 & B-4]. The brine is stored in the brine surge tanks, where it is sampled and checked for the presence of agent. From there, it proceeds to the brine evaporator, where the moisture content is reduced prior to being sent to the drum dryers. The drum dryers reduce the brine to a dried salt and deposit the salt into containers for storage and transportation offsite. Exhaust vapors exiting the BRA drum dryers and evaporators are drawn through the BRA PAS to remove any particulate matter from the exhaust stream.

Brine is no longer processed onsite at TOCDF and is not planned to be processed onsite at ANCDF. PBCDF has also added the capability to transfer brine to tanker trucks for offsite disposal (see FAWB Note B-5). At TOCDF, brine is collected in the brine surge tanks and held prior to discharge into tanker trucks for disposal offsite. The TOCDF BRA configuration at the time of shutdown is described in the following sections for comparison to the design configuration at follow-on sites. The ANCDF configuration is also described even though they do not plan to use the BRA.

2.2 OPERATIONAL SUMMARY

The BRA system processes PAS[2] brine and WTS wastewater (see FAWB Note B-4) into water and dried salts. The complete BRA system consists of brine surge tanks and feed pumps, evaporator package(s), drum dryer package(s), drum dryer air heater package, and the BRA PAS.

The surge tanks, located outside the process utility building (PUB), serve as holding tanks. Each brine surge tank is sampled for corrosivity (pH), chemical agent, and specific gravity (sg) before the brine is allowed into the evaporator or drum dryer packages. RCRA permits at PBCDF and UMCDF also require that brine sent from a brine surge tank to an evaporator meet requirements for toxic organic concentrations. At TOCDF, the first tank of brine generated from a specific chemical agent incineration

[1] TOCDF and UMCDF have two LIC furnaces each. ANCDF and PBCDF each have only one LIC furnace.

[2] For sites with a PAS filter system (PFS), clean liquor from the PFS clean liquor air coolers also can be sent to the brine surge tanks when the air coolers are drained during shutdown.

campaign, and at least annually thereafter, is sampled for health risk assessment (HRA) toxicity characteristic metals, and toxicity characteristic organics. The batch is treated after verifying through sampling and analysis that the brine is free of agent such that drinking water standards are met. The drinking water standard for nerve agents GB and VX is 20 parts per billion (ppb), and below 200 ppb for HD (i.e., mustard). The batch can be preconcentrated by circulating the brine through an evaporator package and returning it to the brine surge tank. Each brine surge tank is equipped with a pump recycle line through which brine can reenter the tank after exiting the feed pump. The batch can be fed through the evaporator package prior to being fed to the drum dryers to increase the solution's sg. Each surge tank has a capacity of 40,000 gallons.

Brine is pumped from the brine surge tanks to the evaporator package using a brine feed pump. Each evaporator package consists of a circulation pump and spare, a heat exchanger, a flash evaporator, and a desuperheater pump. The brine circulation pump sends the brine feed to the heat exchanger. The heat exchanger uses steam to heat the brine before it is sent to the flash evaporator. The desuperheater pump provides a constant source of condensate to the steam desuperheater spray nozzle. Upon entering the flash chamber, the hot brine partially flashes to steam, leaving the salts and metals behind in the liquid brine. This process removes water from the brine, increasing the density and reducing the volume. This process continues until the desired sg is reached. At this point, the concentrated brine either is sent to the drum dryers, or is returned to the brine surge tanks in order to control the evaporator feed rate.

The drum dryer dries the concentrated brine solution to produce solid brine salts. The dryer package consists of two rotary drums, two salt product removal conveyors, and two salt collection containers, all encased in one housing. Concentrated brine from the evaporator package is fed onto the drums and collected in the nip between the two rotating drums. The drums rotate in opposite directions by electric motors. Steam supplied to the interior of the drums heats the drum surfaces and dries the brine. Water from the concentrated brine evaporates on the drums, leaving salt cake behind on the rotating drums. As the drums rotate, knife blades remove the salt cake from the surface. The salts are collected on one of two conveyors and discharged into a collection container. Each collection container is supported on an aluminum pallet dolly and contains a disposable polypropylene sheet bag, inside a polypropylene fabric bag, that has a quick-opening bottom and lifting straps. Full collection containers are closed, moved to the residue handling area (RHA), and replaced with an empty container. Full containers are staged in the RHA to cool. After cooling, the fabric bag is lifted over a roll-off container and the quick-opening bottom is opened, allowing the disposable bag to be released into the roll-off container.

Water vapor from the evaporator package(s)[3] and drum dryers is sent through the BRA PAS and discharged to the atmosphere through an exhaust stack. The BRA PAS removes particulate from the vent exhausts. This system contains a knockout box, burner,

[3] TOCDF and UMCDF each have two evaporator packages. ANCDF and PBCDF have only a single evaporator package.

baghouses, exhaust blower, and elevated exhaust stack. Evaporated water from the drum dryers is combined with heated air at 120°F from the drum dryer air heater package to maintain the drum dryer exhaust above its dew point. The heated exhaust exits the drum dryers and passes through the knockout box, where any heavy solids are knocked out by a stainless steel baffle. Then, the solids are discharged through a rotary valve into a salt container at the bottom of the knockout box. The exhaust passing through the knockout box is pulled through the system to the BRA PAS burner, where the temperature is elevated further to prevent condensation of liquid as the exhaust moves through the BRA PAS system. After being heated by the BRA PAS gas burner, the exhaust flow from the drum dryers merges with the exhaust from the evaporator package(s). The combined flow is sent to the BRA PAS baghouses where particulates are removed. There are four baghouses at TOCDF and UMCDF, and three at ANCDF and PBCDF. An automatic, periodic blast of plant air flushes any accumulated material into a hopper at the bottom of each baghouse. An induced draft (ID) fan provides the motive force to move the exhaust flow through the baghouses and out the elevated exhaust stack.

2.3 PROCESS DESIGN BASIS SUMMARY

The brine surge tanks are designed to have a cumulative storage capacity sufficient for two days of facility operations.

The steam generation system (SGS) supplies steam to the evaporator and the drum dryer packages. The SGS boilers generate saturated steam at approximately 135 pounds per square inch, gauge (psig). Steam to the evaporator packages is regulated to 25 psig, and desuperheated to no more than 5 degrees superheat. Steam pressure to the drum dryers is reduced to approximately 100 psig to supply steam that is approximately 22 degrees superheated.

The incoming brine is maintained at a pH of 5.5 or greater. At UMCDF, the maximum allowable pH for processing is 10.0. The total brine evaporator circulation rate, which includes the circulation rate to the evaporator heat exchanger and the recycle rate back to the surge tank, is 950 gallons per minute (gpm). Brine from the evaporators to the dryers has a 1.2 sg limit in order to prevent salt precipitation (see FAWB Note B-6). The dryers reduce the water content of the brine to approximately 5% moisture by weight in the mass and energy balances. Actual moisture content can range from 5% to 20% by weight.

Entrained particulates are assumed to be 0.036 grain (gr) per standard cubic foot (scf) for the evaporator exhausts, and 1.15 gr per dry scf (dscf) for the dryer exhausts. The designed particulate removal for the BRA PAS baghouses is .01 gr/dscf. The designed particulate emission for the BRA PAS is less than or equal to 0.01 gr/dscf. The designed stream opacity is 0%, as measured by 40 CFR 60, Appendix A, reference method 9.

2.4 SYSTEM BOUNDARIES AND INTERFACES

The BRA system equipment consists of the brine surge tanks, evaporator package, drum dryers, drum dryer air heater package, and BRA PAS.

The primary interfaces include the following:

(1) Pollution Abatement System: Water and caustic used to scrub the exhaust gases from the LICs, DFS, MPF, and DUN (see FAWB Note B-1) becomes contaminated with salts and metals. This brine from the PASs is piped to one of the brine surge tanks for storage and sampling before being processed through the brine evaporator package and drum dryer package.

(2) Water Treatment System: Water treatment system (WTS) wastewater collected in the regeneration waste surge tank (WTS-TANK-103) can contains levels of magnesium and calcium making it unsuitable for discharge to the sanitary sewer system. At PBCDF and UMCDF, this WTS wastewater is processed by the BRA (see FAWB Note B-4).

(3) Residue Handling Area: Dried salts produced as a result of the drying process in the drum dryer, from the knockout boxes in the BRA PAS, and from the blow down of the baghouses are collected in salt containers and transported to the RHA for disposal.

(4) Utilities: The BRA and BRA PAS require fuel gas, electrical power, plant air, process water, steam, and instrument air to operate.

SECTION 3
PROCESS DESCRIPTION

3.1 INTRODUCTION

The typical brine reduction area (BRA) consists of brine surge tanks and pumps, brine evaporator package, drum dryer package, drum dryer air heater package, the BRA pollution abatement system (PAS), and associated instrumentation and piping. All sites have at least one BRA process line with two brine surge tanks, two brine feed pumps, a brine evaporator package, two drum dryer packages, a drum dryer air heater package, and associated instrumentation and piping. TOCDF and UMCDF have two parallel BRA process lines. The second line has only one (1) drum dryer package. In all cases, a single drum dryer air heater package supplies heated air to all of the drum dryers. The exhaust from both single and dual process line configurations passes through a single BRA PAS.

Brine is no longer processed onsite at TOCDF and is not planned to be processed onsite at ANCDF. PBCDF has also added the capability to transfer brine to tanker trucks for offsite disposal (see FAWB Note B-5). At TOCDF, brine is collected in the brine surge tanks and held prior to discharge into tanker trucks for disposal offsite. The TOCDF BRA configuration at the time of shutdown is described in the following sections for comparison to the design configuration at follow-on sites. The ANCDF configuration is also described even though they do not plan to use the BRA.

3.2 DESCRIPTION OF SUBSYSTEMS

3.2.1 Brine Surge Tanks

Each brine surge tank holds 40,000 gallons (gal.) and is approximately 20 ft in diameter, 20 ft high, and constructed of lined carbon steel. The tanks are located just outside the process and utility building (PUB), which houses the rest of the associated BRA equipment. Each tank has an inlet from the PAS, an overflow to the area sump, a drain, a sample connection, a connection for adding neutralization solution, an outlet to the brine feed pumps, an open vent to the atmosphere, and a recirculation inlet line from the brine feed pumps. The recirculation line also is used for the evaporator(s). At all sites except TOCDF, the tanks are externally heated with saturated steam at 135 pounds-per-square-inch, gauge (psig) to maintain the brine temperature above 180°F, thereby preventing precipitation of salts.

The inlet from the PAS normally supplies brine solutions that are continuously bled from the PAS quench brine loops. All sites except TOCDF also have PAS filter system (PFS) clean liquor air coolers that can be drained to the BRA tanks during maintenance and/or shutdown of the air coolers. Clean liquor is drained from any of the air coolers, using air cooler empty out pump PFS-PUMP-142, and supplied to the BRA tanks through the PAS inlet line. Details related to the brine supply from the PAS and PFS can be found in the PAS/PFS programmatic process FAWB, Book 28.

One purpose of the brine surge tank is to act as a holding tank. This enables the brine from the PAS to be sampled before it is sent to be dried. This is a final checkpoint in the process for the presence of residual agent. Site RCRA permits require that brine be sampled, analyzed, and shown to be agent-free prior to feed into the BRA. For this reason, a tank that is being filled cannot simultaneously be used to feed the evaporator or drum dryers. Laboratory analysis is conducted on samples drawn from the tank's sampling connection. If agent is detected in the tank, neutralization solution (i.e., 18% sodium hydroxide [NaOH] for GA and GB; 5-1/2% sodium hypochlorite [NaOCl] for HD and VX) is added to the tank through a hose connection provided for that purpose on the side of the tank.

RCRA permits at PBCDF and UMCDF also require that brine sent from a brine surge tank to an evaporator have a pH between 5.5 and 10.0, have a specific gravity between 1.00 and 1.25 and have toxic organic concentrations less than toxic chemical (TC) limits[1] or nondetectable.

The inlet to each tank from the PAS is through an inlet valve on the top of the tank. This valve does not automatically open; it must be opened remotely by the control room (CON) operator (CRO). Conditions for opening an inlet valve are:

- brine surge tank level below the high-high level,
  AND
- the tank to be filled is not also currently being drained.

The operation of inlet valves must be coordinated between the CRO and the local BRA operator for reasons relating to tank filling procedures. The valves are always operated in MANUAL; there is no AUTOMATIC valve operation mode. High level in the tank, as determined by the tank level transmitter (see FAWB Note B-7), closes the valves through the programmable logic controller (PLC). After a 10-second, preset time delay, the operator can reopen the valve to allow additional brine to be fed to the tank. If the level in the tank rises to the high-high level, the high-high level switch causes the valves to close again and be interlocked from opening. When an inlet valve closes, the PASs have approximately 10 minutes of surge capacity within which the CRO must select another brine surge tank to fill. If all brine surge tanks are full (i.e., at high-high level), or one tank is being emptied and all remaining tanks are full, a control system interlock stops feed to all furnaces.

The tank level, as well as level alarms for low, high, and high-high are indicated locally, and in the CON. A low-low-low level alarm, which alarms in the CON only, is hardwire interlocked to stop the brine feed pumps if they are running. The CON can remotely control the inlet valve and receives inlet valve open and closed status indications.

Each tank has a 5-horse power (hp) agitator mounted on the top of the tank, except at TODCF. TOCDF has 3-hp agitators that protrude through the tank sidewall. The agitator ensures that tank content samples are representative, from a well-mixed batch. It also keeps any salts suspended that normally precipitate from brine solutions. The local BRA operator starts the agitator using a handswitch on the local panel. If the tank level decreases to the

[1] TCs are listed in 40 CFR 372.65 and are regulated under Section 313 of the Emergency Planning and Right-To-Know Act (EPCRA) of 1986.

low-low level, the low-low level condition alarms at the local panel and turns off the agitator. At all sites except TOCDF, the agitator motors are equipped with space heaters to prevent moisture from developing within the motor frame when the motor is deenergized. The agitators are equipped with double mechanical seals (see FAWB Note B-8).

Local control panels for the BRA tank areas (ICS-PANL-104 for BRA-TANK-101/-102 at all sites; ICS-PANL-111 for BRA-TANK-201/-202 at TOCDF and UMCDF) are provided with essential power. This ensures that the brine tank inlet valves can remain open during a loss of utility power. It also allows for continued bleed of brine from the PAS (see FAWB Note B-9). Essential power to the local control panels also ensures that indicators, interlocks, and alarms can continue to function during a loss of utility power.

3.2.2 Brine Feed Pumps

Each process line has two brine feed pumps, one operating and one spare. The outlet from either tank of a process line can be sent to either pump in that process line. The pumps are equipped with a double-mechanical shaft seal (see FAWB Note B-10). At all sites except TODCF, the seal is cooled and lubricated using a pressurized fluid system and cooler, with 50% ethylene glycol ($C_2H_6O_2$) from the primary cooling system (PCS) as the cooling medium. At TOCDF, the pump seals have a provision for closed loop cooling from a water-filled head tank (BRA-TANK-9101A, 9102A, 9201A, 9202A).

The outlet of each brine surge tank is piped to the brine feed pumps in the PUB. Control of the tank outlet is by a local, panel-operated on/off valve. Since brine demand from the drum dryers and evaporator varies, the feed pump discharge can return back to the tank being drained. At TOCDF, the recirculation flow is controlled by a local pressure regulator. At all other sites, the recirculation flow is controlled by a local flow controller. Recycle to each tank is controlled by a local panel operated on/off valve. Tank selection is performed at the local control panel using a handswitch. When a tank handswitch is in the drain position, both the drain and recycle valves for the tank open. Tank drain valve indication is provided in the CON. The tank outlet and recycle valve positions are indicated on the local panel.

Each brine feed pump is controlled independently by a handswitch on the local panel. There is no automatic start of the spare pump. The pumps are hardwire interlocked to stop if any of the following conditions occur:

- Both brine storage tank outlet valves are closed,
- A brine storage tank outlet valve is open and that tank low-low-low level switch trips, or
- The evaporator high-high level switch trips.

Pump operation continues until one of the interlocks causes a shutdown, or until the operator turns off the pump. If a pump fails to perform, the failure is detected by low-level alarms on the evaporator or dryers. When a pump fails, the operator must turn off the failed pump and start the spare.

At TOCDF and UMCDF, pump discharge from either process line can be directed to either line of evaporators and drum dryers by a crossover pipe and appropriate manual block valves. At ANCDF and PBCDF there is only one process line.

3.2.3 Evaporator Package

There is one evaporator package for each process line. Each package consists of a brine heat exchanger, a brine flash evaporator, two brine circulation pumps, a desuperheater pump, and associated piping and instrumentation, including a local control panel. Brine from the brine feed pumps can be processed through the evaporator to improve the performance of the drum dryers. The evaporator can be bypassed if the brine in the surge tanks is at the desired specific gravity (sg) for feed to the drum dryers. In this case, the concentrated brine is sent directly to the drum dryers.

At all sites, wastewater treatment system (WTS) wastewater was originally configured to be sent to either to the evaporator or directly to the drum dryer. ANCDF has received approval to send this wastewater to the local sewage treatment plant. At TOCDF, WTS wastewater is sent offsite for disposal. UMCDF has approved a change to send this wastewater to the brine surge tanks (see FAWB Note B-4). TOCDF observed that sending the WTS wastewater to the evaporators or the drum dryers can have undesirable consequences. When processed through the evaporator package, the high concentration of magnesium and calcium can cause the rate of fouling in the heat exchanger to substantially increase. Processing the WTS wastewater directly to the drum dryer can cause warping of the drums due to the cold temperature of the water. To address these concerns, the designs at ANCDF, PBCDF, and UMCDF were modified to send WTS wastewater directly to the drum dryer in a ratio-control mode. In this mode, WTS wastewater would be ratio-controlled with brine feed to 10% to 12% of total feed to control the temperature and brine density.

When feeding brine to the evaporator package, brine is pumped from a brine surge tank by a brine feed pump. Brine from the brine feed pump combines with brine exiting the flash evaporator bottom, in the suction line to the brine circulation pump. The flow rate from the brine feed pumps is indicated locally, and also in the CON at TOCDF. At all sites except TOCDF, high flow is alarmed in the CON, and recorded by the process data acquisition and recording system (PDAR). At TOCDF, the totalized flow value is displayed in the CON (see FAWB Note B-11), the flow rate and totalized flow are recorded by PDAR, and high-high flow is alarmed locally. Activation of the high-high flow alarm at TOCDF stops feed to the evaporator.

In the evaporator chamber, heated brine flows from the brine heat exchanger and flashing occurs, driving off the water. The evaporator is a vertical vessel (see FAWB Note B-12) with a conical bottom that vents to the BRA PAS. A level controller and valve control the flow of brine into the evaporator chamber, thereby maintaining the level in the chamber. The actual chamber level, as well as level alarms for high-high, high, low, and low-low, are indicated on the local panel. At all sites except TOCDF, these level alarms also report in the CON and are recorded by PDAR. The low-low level switch is hardwire interlocked to close the steam flow control valve, stopping the flow of steam that heats the brine heat exchanger. The high-high level switch is hardwire interlocked to stop the brine feed pump that fills the evaporator, and to close the valve that admits WTS wastewater to the evaporator. This valve normally will be closed since there are no sites that plan to process WTS wastewater directly in the evaporator package (see above and FAWB Note B-4).

Each evaporator package includes two brine circulation pumps, one operating and one spare installed without piping. Each brine feed pump is controlled by handswitches on the local panel. There is no automatic start of the spare pump. The spare pump is not piped to the system. This prevents sludge buildup in the unused pipe section. Use of the spare pump requires the piping to be disconnected from the pump in use, swiveled around, and connected to the spare pump.

At all sites except TOCDF, the brine circulation pumps have an external pump seal that is cooled by water in a pressurized, closed-loop system equipped with a natural-convection heat exchanger. At TOCDF, the brine circulation pumps have a mechanical shaft seal that is cooled and lubricated by water in a pressurized, closed-loop system equipped with a forced-air-cooling heat exchangers. The cooler uses FDA-22, Royal Purple, Barrier Fluid as a heat transfer medium (see FAWB Note B-13), and operates whenever the pump is running. At TOCDF only, the pumps are hardwire interlocked to stop if the evaporator low-low level switch trips.

Brine flows from the circulation pump to the brine heat exchanger. The heat exchanger is a plate and frame type; specifications are shown in Table 3.1. The steam flow rate is controlled by a flow controller and valve. The steam rate increases as the outlet brine temperature falls, and decreases as the brine temperature rises. Steam rate also varies based on the agent being processed by the furnaces. Condensate collects in the bottom of the heat exchanger and returns to the deaerator for use as boiler feed. At TOCDF, the low pressure condensate pump provides additional head to the fluid being returned to the deaerator (see FAWB Note B-14). A density controller monitors the brine density and overrides the flow control on the steam flow rate at high density (see Table 3.2). This occurs when the drum dryers are running slowly and flow from the evaporator system is reduced.

Table 3.1 Brine Heat Exchanger Specifications

	FACILITY			
	TOCDF	**UMCDF**	**ANCDF**	**PBCDF**
Number of Plates	112	114	135	135
Plate Surface Area (sq. ft ea.)	≈8.0	8.1	9.1	9.1
Heat Exchanger (HX) Length (inches)	59	59	59	59
HX Thickness (inches)	12	29	30.75	30.75
HX Height (inches)	≈82	82	89	89
Supply Steam Pressure (psig)	135	135	135	135
Supply Steam Flow Rate (lb/hr)	9,580	8,890	13,757	13,757

Table 3.2 TOCDF Brine Heat Exchanger Specific Gravity by Agent Campaign

	H	GB	VX	HD
Density Septpoint (sg)[a]	1.15	1.25	1.15	1.14

[a] Exact values are dependent upon the brine composition (see FAWB Note B-6); ANCDF, PBCDF, and UMCDF setpoints will be similar.

A 1.5 hp desuperheater supply pump provides a constant source of condensate from the brine heat exchanger condensate line to the steam desuperheater spray nozzle. This ensures that the steam to the heat exchanger is superheated no more than 5 °F. Flow to the desuperheater spray nozzle, at approximately 1.5 gal. per minute (gpm), is controlled by manually adjusting a throttling valve. This valve normally is set during startup and not adjusted during operation. Block valve 23-XV-61 on the desuperheater supply line is interlocked with steam supply control valve 23-FV-834 to prevent flow to the desuperheater spray nozzle when the steam supply control valve is closed.

Heat exchanger plate cleaning frequency depends on the brine content and on the quantity of WTS wastewater processed. There are no sites that plan to process WTS wastewater directly in the evaporator package (see FAWB Notes B-1 and B-4). Local pressure indication determines the differential pressure across the heat exchanger. A high differential pressure indicates a fouling of the heat exchanger and a need for cleaning.

Brine leaves the evaporator package via a 1½inch bleed line that diverts brine from the 6-inch brine circulation pump discharge piping. The brine can be directed to any of the drum dryers, or returned to a brine surge tank. The bleed line flow rate is measured by a magnetic flowmeter, and indicated locally. At TOCDF, this flow rate and the totalized flow are displayed in the CON (see FAWB Note B-11). A high-high flow alarm shuts down feed to the drum dryers.

At TOCDF, a density controller controls the brine surge tank return flow by modulating a control valve (23-DV-834) to maintain the desired brine density in the evaporator package. If the density is above setpoint, the valve is modulated open to reduce the brine volume in the evaporator package, thereby allowing more lower-density brine to be pumped from the brine surge tank. If the density is below setpoint, the valve is modulated closed to allow the brine in the evaporator package to be further concentrated. At PBCDF, a flow controller controls the brine surge tank return flow by modulating a control valve (23-FV-831) to maintain a constant total bleed flow from the evaporator package. If the bleed flow is above setpoint, the valve is modulated closed to reduce the flow from the evaporator package. If the bleed flow is below setpoint, the valve is modulated open. At ANCDF and UMCDF, the current design has a manual valve for control of the brine surge tank return flow. An ECP was prepared to modify ANCDF and UMCDF similar to PBCDF. These ECPs are under review by the systems contractors at the respective sites (see FAWB Note B-15).

Loss of circulating flow through the brine heat exchanger can cause brine salts to solidify and prematurely foul the heat exchanger. To prevent this occurrence after a loss of offsite power, TOCDF moved the brine circulation pumps from a nonessential power source to an essential one (see FAWB Note B-16). The pumps, however, do not automatically restart

when the emergency diesel generators reenergize the essential power buses. A BRA operator must manually restart the pumps at the local control panel. At follow-on sites, the brine circulation pumps currently are powered from a utility power source. Changing the power source to an essential bus is currently under consideration (see FAWB Note B-16).

In the event of unscheduled maintenance or upset conditions requiring emptying of the evaporator back to the brine surge tanks, flow is directed from the circulation pump and discharged by means of manual valving and the evaporator recirculation line.

Alarms that indicate on the local control panel also are sent to a common trouble alarm in the CON. The position of the valve that admits WTS wastewater to the evaporator is indicated in the CON, and on the local panel. All other indicators and controls are provided only at the local panel.

3.2.4 Drum Dryer Package

Drum dryers are used to dry concentrated brine or WTS wastewater (see FAWB Note B-4). Primary BRA process lines include two drum dryer packages. The second line at TOCDF and UMCDF has only one drum dryer package. Each dryer consists of two 12-ft-long, 42-in.-diameter, rotating drums. One drum is anchored and the other is adjustable to allow setting the desired distance between the drums. This separation is optimally set at 1/8 in. The drums rotate towards the center of the dryer and are driven by 25-hp, variable-speed motors that rotate from 1 to 12 revolutions per minute (rpm).

A nip level controller (see FAWB Note B-17) and valve regulate the brine level between the drums by controlling the brine feed rate to the drum dryer. The nip is the volume of liquid held between the two drums and the end boards. The drum dryer can receive feed from the brine surge tank and/or from the WTS. In the ANCDF, PBCDF and UMCDF designs, WTS wastewater is mixed with brine to raise the temperature of the WTS wastewater and increase its density. ANCDF and UMCDF do not plan to send WTS wastewater directly to the drum dryer (see FAWB Note B-4).

Brine from the brine surge tank can be processed either through the evaporator package, before being sent to the dryer, or directly from the brine surge tank. Brine flow to the drum dryers is drawn from the circulation pump discharge. The brine flow rate to each drum dryer is measured by a magnetic flowmeter, displayed locally and in the CON, and recorded by PDAR (see FAWB Note B-18). The totalized flow for each drum dryer is displayed in the CON and recorded by PDAR.

At all sites except TOCDF, a magnetic flowmeter measures the flow in the common header to all three drum dryers. The flow rate is displayed locally. The totalized flow value is displayed in the CON, and recorded by PDAR. A high flow alarm sounds and stops feed to the drum dryers if the flow exceeds the Resource Conservation and Recovery Act (RCRA)-permitted hourly flow rate.

Feed is provided to the dryer nip by a single feed pipe at ANCDF, three feed pipes at TOCDF (see FAWB Note B-19), and a pendulum feed system at UMCDF and PBCDF. The actual level, as well as level alarms for high and low are indicated on the local panel. The high level switch is hardwire interlocked to close the valve that admits WTS wastewater

to the drum dryer. Dryer feed is controlled by flow, versus level at TOCDF; relief has been requested from the State on the waste cutoffs initiated on dryer nip level.

The drums are heated by steam. Steam is reduced from 135 to approximately 100 psig and supplied to the interior of the drums. The maximum steam feed rate is 3881 pounds per hour (lb/hr). It is estimated that from 1.1 to 2.5 pounds of steam are needed to evaporate one pound of water. A pressure controller and control valve (see FAWB Note B-20) control steam flow to the drums. A steam pressure low alarm is indicated locally and in the CON, and is recorded by PDAR.

Condensate from the drum dryer drains to the low-pressure condensate receiver. The low-pressure condensate receiver vents to the atmosphere. The receiver stores condensate until a predetermined level is reached. When this level is reached, the low-pressure condensate pump starts and the condensate is pumped to the deaerator, and then sent to the boiler as feedwater. The TOCDF high-pressure condensate return system is described in Section 3.2.5. It is important to note that the drums must continue to rotate when being supplied with steam. If the drums remain stationary, steam condensing in the drum can warp the outer surface. Therefore, to allow the drums to be rotated after a loss of offsite power, the drum dryer packages are connected to an essential power source (see FAWB Note B-16). The drum dryer drives, however, do not automatically restart when the emergency diesel generators reenergize the essential power buses. A BRA operator must manually restart the drum dryer drives at the local control panel.

Brine salt cake is scraped from each drum using a 0.25-in.-thick, 5-in.-wide, 12-ft-long tempered steel knife blade. The pressure and angle of the blades are manually adjustable. The dried brine salts are scraped off the drum and fall through a collection guide located beneath the outside edge of each drum. The salts are transported, via an enclosed conveyor, to the collection container. The estimated maximum salt production rate per drum dryer is 900 lb/hr, with a moisture content of 5 to 20% by weight.

Two screw conveyors driven by a 1/2-hp, single speed motor service each drum dryer at PBCDF and UMCDF. At ANCDF and TOCDF, two 12-in.-wide belt conveyors driven by a 1-hp, single-speed motor are used (see FAWB Note B-21). The conveyor belt is made of polyvinyl chloride and rides on stainless steel rollers. A wiper blade scrapes any residual brine salts off the underside of each belt conveyor. At all sites, each conveyor motor is controlled by a separate handswitch, with motor status indicators on the local control panel. A metal chute under the conveyor carries the salts to a waste container (see FAWB Note B-22). The waste containers are polypropylene fabric bags with quick-opening bottoms that are lined with disposable, polypropylene sheet bags. When full, the bags are closed, the bin covered, and rolled on pallet dollies to the RHA for cooling and disposal into rolloff containers.

Each drum dryer is enclosed by a steel housing. The air space within the enclosure is maintained at a slightly negative pressure by the BRA PAS induced draft (ID) fan. The initial design at TOCDF supplied air to the dryer directly from the dryer room. This resulted in a negative pressure in the room and interfered with personnel door operations. In addition, it was necessary to keep the room wall louvers open during the winter, which prevented the unit heaters from maintaining temperature. At TOCDF, an air handling unit

was installed with insulated ducting to supply heated air to each dryer enclosure at 8419 actual cubic feet per minute (acfm) at approximately 107°F. At follow-on sites, drum dryer air heater package BRA-HEAT-110 supplies heated air to each drum dryer enclosure at approximately 9600 acfm and 120°F. The preheated air is drawn into the drum dryers through air plenums along the length of each side of the drum dryer. The exhaust from each drum dryer flows through separate ducts into the knockout box, enters the BRA PAS gas burner as one combined stream, and merges with the exhaust from the evaporator flash chamber(s) prior to entering the BRA PAS baghouses.

3.2.5 High Pressure Condensate Pumping System

At TOCDF only, condensate is returned from the drum dryers to the boiler for reuse via the high-pressure condensate pumping system (see FAWB Note B-23). Gravity drains from the drum dryers are collected in the receiver tank. When the level reaches a predetermined setting, the three-way collection valve stops condensate flow into the receiver tank and introduces high-pressure steam for pumping the condensate to the deaerator. After pumping, the three-way collection valve equalizes system pressure by allowing the receiver tank to vent the pumping steam to atmosphere. Once the pressure is equalized, condensate flow is re-established to the receiver tank.

Indications and alarms are located on the local TOCDF control panel; alarms also are fed to a common trouble alarm in the CON.

3.2.6 BRA and BRA PAS Sumps

There are three sumps at ANCDF and PBCDF and four at TOCDF and UMCDF associated with the BRA and BRA PAS. Sump locations are shown in Table 3-3. The sumps provide secondary containment for any leakage from the process equipment. Each sump is 27-in. square and 27-in. deep. The sumps are made of 6-in.-thick reinforced concrete, lined with 3/16-in. steel, coated with a special coating, and covered with galvanized steel grates. Each sump has an 85-gal. capacity. The brine storage area sumps are located outside and have electric sump heaters, activated by a temperature switch, to prevent freezing in the sump.

Table 3.3 BRA and BRA PAS Sump Locations

	FACILITY			
LOCATION	**TOCDF**	**UMCDF**	**ANCDF**	**PBCDF**
Diked Brine Storage Area	X	X	X	X
Evap & Dryer Line 1	X	X	X	X
Evap & Dryer Line 2	X	X	N/A	N/A
BRA PAS Baghouses	N/A	X	X	X

Each sump has an air-driven, diaphragm pump controlled by a local hand-off-auto (HOA) switch. In AUTO mode, the pump is activated by local level switch (see FAWB Note B-24). At all sites except TOCDF, the storage area, line 1, and BRA PAS sump pumps discharge into a common header that flows either to the PAS area sump, or to brine surge tank BRA-

TANK-101 or –102. At TOCDF, the storage area and line 1 sump pumps discharge into a common header that flows only to brine surge tank BRA-TANK-101 or –102. At UMCDF, the line 2 sump contents are pumped either to the PAS area sump, or to brine surge tank BRA-TANK-201 or -202. At TOCDF, the line 2 sump contents are pumped to brine surge tank BRA-TANK-201 or -202. Thus, at TOCDF, flow destination is not selectable; all sump solutions can be pumped only to the brine surge tanks.

At all sites except TOCDF, flow destination is selected after a local determination of sump contents has been made. Nonbrine solutions (i.e., water) are pumped to the PAS area sump for processing through the PAS systems, and brine solutions are pumped to the brine surge tanks. The selection of flow destination is made by a local, panel-mounted handswitch (23-HS-016) that controls two on-off valves, one on the line to the PAS area sump and one on the line to the surge tanks. When one valve is open, the other is closed, and vice versa. All pumps are interlocked to shut down on a PAS area sump high-high level alarm. At TOCDF, 23-HS-016 controls only one valve, the on-off valve to the brine surge tank.

A high-level alarm, set at 0.25 inches from the bottom of the sump, alerts the CRO of liquid presence in a sump. A high-high-level alarm, set at 6 inches from the top of the sump, warns the CRO that the high-high level has been reached, but no automatic action is initiated (see FAWB Note B-24).

At all sites except TOCDF, the flow rate from each sump is measured by a flowmeter, and indicated locally. A local totalizer displays the total flow from the sump. At TOCDF, the combined flow rate from the storage area and line 1 sump pumps to BRA-TANK-101 and –102 is measured by a flowmeter, and indicated locally. A local totalizer displays the total flow into the tanks. Similarly, the flow rate from the line 2 sump pump to BRA-TANK-201 and –202 is measured by a flowmeter, and indicated locally. A local totalizer displays the total flow into the tanks.

3.3 BRA PAS INTRODUCTION

The BRA PAS is designed to remove particulate matter from the evaporator and drum dryer exhausts. The main components of the BRA PAS are the knockout box, gas-fired burner, baghouse modules, exhaust fan and stack, piping, instrumentation, and ancillary support equipment.

Heated air from the drum dryer air heater is combined with evaporated water from the drum dryers to produce a hot exhaust. This hot exhaust exits the drum dryers and passes through the knockout box, where any heavy solids are knocked out by a stainless steel baffle. The solids are discharged through a rotary valve into a salt container at the bottom of the knockout box. The exhaust passing through the knockout box is pulled through the system to the BRA PAS burner, where the temperature is elevated to prevent condensation of liquid as the exhaust moves through the BRA PAS system. Downstream of the burner, the evaporator exhaust is mixed with the drum dryer exhaust, and passes by the temperature control thermocouple, which is set at 250°F. The 250°F exhaust is drawn through the baghouses, where any remaining particulate is filtered out before the exhaust exits through the blower and out the stack.

3.4 DESCRIPTION OF BRA PAS SUBSYSTEMS

3.4.1 Dryer Knockout Box

The exhaust from each drum dryer is separately directed to dryer knockout box BRA-SEPA-105. Pressure and temperature indicators in each duct determine process conditions during operations. At the dryer knockout box, the exhaust stream is slowed to allow the heavier particulate and water condensation to leave the flow. The particulates and condensation are discharged through the knockout box, hopper, rotary airlock and flexible connector to a sealed container. The particulate discharge is sealed to eliminate fugitive emissions. The dryer knockout box is heated with eight 1.0-kilowatt (kW) heaters to reduce moisture condensation, except at TOCDF. TOCDF heaters are 2.0 kW. Two vibrators keep the salt from sticking to the sides. A rotary valve drops salt into a salt container beneath the knockout box. As the exhaust stream leaves the knockout box, the velocity is increased to prevent any particulate from building up on the inside of the piping.

3.4.2 BRA PAS Burner

Drum dryer exhaust streams are combined in the knockout box and routed to the direct-fired, BRA PAS gas burner. At TOCDF, a fuel gas totalizer monitors burner gas use (see FAWB Note B-25). The burner raises the dryer exhaust temperature to 250°F, preventing condensation in the system. Fuel flow to the burner is regulated by a temperature control loop. The thermocouples are located no more than two duct diameters upstream of any branch to a baghouse module. After exiting the BRA PAS gas burner, the drum dryer exhaust merges with the moisture-laden exhaust from the evaporators.

3.4.3 BRA PAS Baghouses

The exhaust stream is drawn into the BRA PAS baghouses. The baghouse specifications are given in Table 3-4. Each baghouse contains 210 filters made of Unipore-brand material, with a filter efficiency of 99.99% for particulate greater than 0.3 microns, except at TOCDF. TOCDF utilizes Teflon-coated polyester filters. The design air-to-cloth ratio is 4.12:1. The differential pressure across each baghouse is monitored. Automatic waste feed cutoffs and system shutdown alarms are generated for excessively high or low differential pressures (see Appendix C, Alarm and Interlock Matrices, for site-specific alarms and setpoints). When the pressure drop across the bag reaches 4 inches water column (in. wc.), a compressed air, pulse jet, cleaning system is activated. The particulate drops from the bags to the bottom of the baghouse, where it is discharged through a rotary air lock equipped with a 6-in.-diameter pipe that empties into a sealed container. A fugitive dust emission enclosure has vinyl-curtained doors for easy access. The bottom of each baghouse module has sloped sides and electric vibrators to facilitate the discharge of collected particulate matter. Each baghouse is equipped with eight 1.0-kW heaters to maintain internal baghouse temperature above the dewpoint, except at TOCDF. TOCDF heaters are 2.0 kW.

At TOCDF and UMCDF, at least three baghouses must be in operation when two evaporator packages and three drum dryers are operating. At ANCDF and PBCDF, at least two baghouses must be in operation when the evaporator package and drum dryers are operating.

Table 3.4 BRA PAS Specifications

	FACILITY			
COMPONENTS	**TOCDF**	**UMCDF**	**ANCDF**	**PBCDF**
Number of Knockout Boxes	1	1	1	1
Number of Baghouses	4	4	3	3
Blower hp rating	200	200	150	150

3.4.4 BRA PAS Exhaust Blower

BRA PAS exhaust blower BRA-BLOW-102 provides the motive force to move the exhaust flow through the BRA PAS and out the BRA PAS stack. All BRA PAS ductwork is designed with a minimum standard diameter that yields a gas velocity of no greater than 10,000 ft/min. The ductwork is routed to minimize the number and sharpness of elbows in order to reduce particulate buildup.

All applicable controls, valves, and instrumentation necessary for the operation of the system are hardwired to the control panel. All key process instrumentation, dampers, and control valves, including damper position, are displayed on the control panel. The stack is equipped with a flow probe that indicates flow on the control panel. If the flow drops below the design flow, an alarm sounds. Alarms also sound if the temperature of the exhaust stream entering the baghouse is below 225°F. The burner is interlocked to shut down if the baghouse inlet temperature rises above 280°F, but the burner combustion air blower continues to run. When the temperature reaches this point, the baghouse inlet and outlet dampers close, the baghouse bypass damper opens, and the evaporator exhaust vents to atmosphere. All brine feed to the evaporators and drum dryers is shut off by this interlock action. The burner also is interlocked by exhaust fan failure. This interlock shuts down the burner and the combustion air blower. Exhaust fan failure also puts the baghouse damper in bypass and vents the evaporator exhaust to the atmosphere. This interlock also shuts off brine feed to the evaporators and the drum dryers. At TOCDF, the baghouse bypass valve, evaporator, and dryer exhaust ducts to the atmosphere are all welded shut and do not function as described above (see FAWB Note B-26).

At all sites except TOCDF, an automatic, continuous air-monitoring system (ACAMS) continuously monitors the BRA stack for the presence of agent. Detection of agent above the allowable stack concentration (ASC) level results in a waste feed cutoff for the BRA system. TOCDF eliminated the requirement for ASC ACAMS or depot-area, air-monitoring system (i.e., DAAMS) monitoring of the BRA stack since brine is verified by analysis to agent free prior to processing in the BRA (see FAWB Note B-27).

3.5 CONTROL SEQUENCE LIST

The following subsections present the control sequences for BRA and BRA PAS operations. The control sequences are based upon the TOCDF standing operating procedures (SOPs), PLC, and burner management system logic, except for the drum dryer air heater package sequences, which apply to follow-on sites only. The overall sequence for startup is to place the BRA PAS into operation, followed by the drum dryer air heater package, the drum dryers, and then the evaporator package. The startup of these systems is dependent upon each other for operation. For example, the evaporator package requires time to warm up and concentrate brine before providing feed to the drum dryers. The drum dryers require time to warm up. Therefore, evaporators and drum dryers can be started simultaneously.

3.5.1 BRA PAS Startup

The startup sequence for the BRA PAS is given below.

(1) Drain all liquids from the BRA PAS exhaust blower and handle as hazardous waste.

(2) Ensure knockout box and baghouse salt containers are in place.

(3) Ensure knockout box and baghouse manual slide gates are open.

(4) Start knockout box and baghouse rotary valves and vibrators.

(5) Open BRA PAS supply dampers.

(6) Start the BRA PAS blower; verify amperage within limits.

(7) Start baghouse and knockout box heaters.

(8) Open the exhaust damper from 14,000 to 25,000 standard cubic feet per minute (scfm).

(9) Start the BRA PAS burner. If burner fails to light, attempt restart after purge is complete.

(10) Run burner on low fire for 10 minutes; do not let the duct temperature exceed 275°F.

(11) Stabilize the baghouse inlet temperature at 265°F.

(12) Adjust exhaust flow to 25,000 scfm using the minimum flow to clear alarms at 1.0 in. wc.

(13) The BRA PAS is now in HOT STANDBY and ready for brine feed.

(14) As brine feed process begins, adjust the exhaust flow for the minimum flow required to clear alarms at 1.0 in. wc. on PI-143, -144, -145, and, at TOCDF and UMCDF, also -186.

3.5.2 BRA PAS Operations

(1) Read and Record system readings.

For any RCRA non-normal operational ranges, perform the following:

(1) Stop feed to the drum dryer.

(2) Stop steam flow to the evaporator heat exchanger.

(3) When the knockout box or baghouse container reaches RCRA full level (i.e., 4 inches from the top), perform a change out per the SOP.

3.5.3 Drum Dryer Air Heater Package Startup

(1) Open drum dryer heated-air inlet damper(s) to drum dryer units to be operated.

(2) Start heater using local handswitch.

(3) Ensure heated air to drum dryers is at 120°F.

3.5.4 Drum Dryer Startup

(1) Ensure nothing is on or between the drums.

(2) Verify that both pairs of end boards operate freely by adjusting pneumatic pressure and observing that boards contact the drums. Then, adjust pneumatic pressure to 0 psig and verify that end boards are not tight against the drums.

(3) Ensure the gap between the drums is approximately 1/8 in.

(4) Ensure oil reservoir is full and bearings are properly lubricated.

(5) Ensure the knife blades are raised, clean, and in good condition.

(6) Start the drum; listen for abnormal sounds.

(7) Place the drum drive speed controller in AUTOMATIC, increase output to 100% (i.e., 12 rpm), and listen for abnormal sounds.

(8) Decrease the drum drive controller output to 0% (i.e., 2 rpm).

(9) Slowly open the steam supply valve and adjust the pressure controller to 10 psig.

(10) Start the Liquimover.

(11) Preheat the drum dryer with 10 psig steam for 30 minutes. Then, increase steam pressure by 10 psig every 20 minutes until steam pressure is 40 psig.

(12) Continue heating the drum dryer by increasing steam pressure by 10 psig every eight to 10 minutes until operating pressure is reached (i.e., 90 to 120 psig).

(13) Place a properly labeled salt container under the discharge of the conveyor for each drum.

(14) Adjust the dryer drum gap to between 0.006 to 0.004 in. using .050-in. solder.

(15) Ensure that drums are heated at operating temperature for a minimum of eight hours before brine is introduced onto the drums.

(16) Adjust the end board pressure regulator to bring the end boards against the drums.

(17) Start the drum dryer side conveyor.

(18) Adjust the knife blade regulator until the knife blades are within 1/8 to 1/4 in. from the drum; allow the blades to warm up for 25 minutes.

(19) Verify that the evaporator is up and running (see Section 3.5.8). At PBCDF and UMCDF, verify that the pendulum feed motor is running.

(20) Open the brine feed bypass to place a thin coat of salt on the drum.

(21) Increase the knife blade pressure regulator until the blades come in contact with the drum; allow the blades to heat up for 10 minutes.

(22) Adjust the knife blades to obtain a uniform cleaning of the drum.

(23) Place the drum dryer level controller in MANUAL; set the output to 0%.

(24) Manually bring nip level up to operating level; place the controller in AUTOMATIC.

3.5.5 Drum Dryer Operations

Note: In the ANCDF, PBCDF and UMCDF designs, WTS wastewater feed to the drum dryers normally is ratio-controlled with brine feed, from 10% to 12% of total feed, to control the temperature and brine density. ANCDF and UMCDF do not plan to send WTS wastewater directly to the drum dryer (see FAWB Note B-4).

(1) Visually inspect the lubricators once an hour for proper operations.

(2) Ensure end scrappers are keeping drum ends clean.

(3) Adjust end board pressure at its minimum value to prevent brine leakage.

(4) Change out the salt containers when they are 3/4 full.

(5) Maintain adequate moisture content in the materials.

a. Correct for excessive moisture in materials by performing one or more of the following:

- Increase steam pressure to the drum dryer.
- Decrease controller setpoint if nip level is above three inches.
- Decrease drum rotation to 2 rpm.
- Reduce the gap between the drum dryer drums.

b. Correct for too dry material by performing one or more of the following:

- Adjust knife blades.
- If drums are too close together, increase gap.
- If steam pressure is too high, decrease steam pressure.

- If liquid level is too low, increase brine level.
- If drum speed is too slow, increase drum speed.

(6) Correct for wet drum ends by performing one or more of the following: adjust end board pressure, decrease drum rotation speed, increase steam pressure, or decrease drum gap.

3.5.6 Drum Dryer Emergency Shutdown

Close the brine feed inlet and steam supply valves by placing the controllers in MANUAL and reducing the setpoint to 0 psig.

Follow appropriate safety precautions and bleedoff the steam line pressure to the effected dryer.

3.5.7 Drum Dryer Shutdown to Hot Standby

(1) Stop brine feed to the dryer by closing the level control valve.

(2) Ensure the drum dryer nip is empty and drums are scraped clean.

(3) Raise the drum knives by turning the knife position switch to off.

(4) Adjust the end board regulator to 0 psig.

(5) Increase drum dryer gap by turning the adjusting wheel two turns clockwise.

(6) Stop the drum dryer conveyors.

(7) Reduce the drum speed controller output to 0% (i.e., 2 rpm).

3.5.8 Brine Evaporator Startup

(1) Place the brine level controller in MANUAL and adjust to 0% (i.e., valve closed).

(2) Place the steam flow controller in MANUAL and adjust to 0% (i.e., valve closed).

(3) Close water softener feed valve using local handswitch.

(4) Open the heat exchanger vent valve one full turn.

(5) Fill the evaporator with process water to a level between 30 and 35 in.

(6) Set the evaporator level controller set point to 35 in.; place the controller in AUTOMATIC.

(7) Verify brine circulation pump seal tank level is at least 1/2 full and low level alarm clear.

(8) Ensure that the seal fluid cooler is functioning.

(9) Start the brine circulation pump and verify discharge pressure between 15 and 25 psig; allow the water to circulate at 35 in. wc. for 15 minutes.

(10) Adjust the heat exchanger steam pressure regulating valve to maintain 50 psig.

(11) Place the heat exchanger steam flow controller in MANUAL; increase steam flow to 5% capacity, and wait 5 minutes. Continue to increase steam flow 5% every five minutes until steam flow is 15%.

(12) Place the switches for condensate pumps 1 and 2 in the ON position; verify that both power indicator lights are illuminated.

(13) Verify condensate pumps function correctly by observing the filling and pumping indicator lights for each unit, ensuring they cycle correctly.

(14) Verify heat exchanger liquid temperature is 204 °F (i.e., in HOT STANDBY) and ready for brine feed.

(15) CON verifies that brine sampling is complete and within specifications.

(16) Select a tank to be drained by using the Shift Manager's key switch.

(17) Start the brine feed pump.

(18) When brine density reaches 1.20 to 1.25 sg (see FAWB Note B-6), align the evaporator to recirculate back to the brine surge tank.

3.5.9 Brine Surge Tank Startup

(1) Open the BRA tank inlet valve.

(2) Uncap and lower the cathodic protection probe into the tank being filled; turn on the power to the probe.

(3) When the tank level reaches 38 in., start the tank agitator by pushing start pushbutton. The agitator should be running whenever level is above 38 in. When the low-low level switch trips, an alarm sounds and the hardwired interlock turns off the agitator.

(4) When the level in the tank reaches high and the PLC automatically closes the inlet valve, select another tank to be filled or bypass the interlock by placing the inlet valve in MANUAL and opening it.

(5) If the tank level reaches high-high and the hardwired interlock automatically closes the valve, select another tank to be filled or shut down the PAS.

3.5.10 Brine Evaporator Operations

(1) Read and Record system readings.

(2) Place steam controller in AUTO mode and adjust setpoint "S" to 35% capacity.

(3) Place density controller in AUTO mode and adjust setpoint "S" to the desired density setting.

(4) Increase steam flow capacity by 10% every five minutes until density approaches desired specific gravity.

(5) Verify that the system is at steady state before sending brine to drum dryers.

(6) Adjust brine surge tank recirculation flow to between 0 and 23 gpm.

(7) Adjust the steam flow controller to maintain desired density with required flow.

(8) When steady state is reached, open the brine dryer isolation valve and close the brine surge tank isolation valve.

3.5.11 Brine Evaporator Emergency Shutdown

(1) Manually close main steam header valve.

(2) Stop the brine circulation pump

(3) Open main breaker on BRA evaporator control panel.

(4) Stop the BRA pump.

3.5.12 Brine Evaporator Normal Shutdown

(1) Stop the brine feed by stopping the brine feed pump.

(2) Flush the brine feed pump by connecting a process water hose to the inlet drain valve.

(3) Open the process water supply valve; allow process water to flush back to the brine surge tank for five minutes. Close the brine surge tank to brine feed pump isolation valves.

(4) Reduce steam flow to the evaporator by placing the flow controller in MANUAL and reducing output to 5%.

(5) Continue running process water to the evaporator until the specific gravity is 1.01.

(6) Open the evaporator recirculation valve; allow process water to flush back to the brine surge tank and then close the valve.

(7) Continue feeding process water to the drum dryer for three minutes after reaching an evaporator specific gravity of 1.01. Maintain flush water temperature by adjusting steam flow to the heat exchanger.

(8) Close the process water supply isolation valve and the brine feed pump inlet drain valve.

(9) Close the brine level controller by placing the level controller in MANUAL and reducing the output to 0%.

(10) Shut down steam flow to the evaporator by adjusting the flow controller output to 0%, closing the steam header isolation valve.

(11) When level in the flash chamber reaches the low level, turn off the brine feed pump and close the brine feed valve to the drum dryer.

(12) If the evaporator is to be shutdown for more than 72 hours, completely drain the system.

3.5.13 Drum Dryer Normal Shutdown

(1) Complete the drum dryer shutdown to HOT STANDBY mode.

(2) Remove the salt containers from beneath the conveyors and place the cover on the container.

(3) Close the steam supply valve.

(4) When drum dryer temperatures is below 250 °F, clean the drum with the BRA steam cleaner.

(5) One hour after washing the drum dryer, shut down the drum dryer drive; clean and inspect the drum knifes.

(6) Clean the end boards.

(7) For extended shut downs, drum protective oil coating on drums and knife blades may be applied[2].

3.5.14 Drum Dryer Air Heater Package Normal Shutdown

(1) Stop heater using local handswitch.

(2) Close drum dryer heated-air inlet dampers.

(3) Ensure heated air to drum dryers is at 120°F.

3.5.15 BRA PAS Normal Shutdown

(1) Ensure that the drum dryers and evaporators are not processing brine or hazardous waste.

(2) Switch the BRA PAS burner control to off.

(3) Stop the BRA PAS combustion air blower.

(4) Stop the BRA PAS exhaust blower.

(5) Operate the rotary airlock, hopper vibrators, and pulse cleaning system for approximately 30 minutes after shutdown of BRA PAS exhaust blower.

(6) Stop the baghouse and knockout box vibrators and airlocks.

(7) Ensure the baghouse dampers are closed.

(8) Ensure the baghouse and knockout box heaters are off.

[2] Addition of oil adds organics to the BRA system. This procedure may not be allowable if the oil causes the organic content to be exceeded.

SECTION 4
COMPONENT SUMMARY

4.1 BRA SYSTEM COMPONENTS

The BRA components are grouped in five subsystems:

- Brine Surge Tank and Brine Feed Pump
- Evaporator Package
- Drum Dryer Air Heater Package
- Drum Dryer Package
- Brine Reduction Area Pollution Abatement System.

Brine is no longer processed onsite at TOCDF and is not planned to be processed onsite at ANCDF. PBCDF has also added the capability to transfer brine to tanker trucks for offsite disposal (see FAWB Note B-5). At TOCDF, brine is collected in the brine surge tanks and held prior to discharge into tanker trucks for disposal offsite. The TOCDF BRA component configuration at the time of shutdown is described in the following subsections for comparison to the components at follow-on sites. The ANCDF configuration is also described even though they do not plan to use the BRA.

4.1.1 Brine Surge Tank and Brine Feed Pump

The primary components of this subsystem are the brine surge tanks and agitators, brine feed pumps, automatic block and control valves, and associated instrumentation. Design parameters for the brine surge tank and brine feed pump are listed in Tables 4.1 and 4.2, respectively.

Table 4.1 Brine Surge Tank[a] Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	4	4
Tag #(s)	BRA-TANK-101/102	BRA-TANK-101/102	BRA-TANK-101/102/201/202	BRA-TANK-101/102/201/202
Size	20'0" Diameter 20'0" Height	20'0" Diameter 20'0" Height	20'0" Diameter 20'0" Height	20'0" Diameter 20'0" Height
Capacity	40,000 gallon	40,000 gallon	40,000 gallon	40,000 gallon
Design Pressure Temperature	Atmospheric 360°F	Atmospheric 360°F	Atmospheric 185°F	Atmospheric 360°F
Construction	Carbon Steel, Teflon FEP or PVDF Lining	Carbon Steel, Teflon FEP or PVDF Lining	Carbon Steel, Modified Epoxy Lining	Carbon Steel, Siloxirane 2032/2031 Lining
P&ID(s)	AN-2-D-501	PB-2-D-501	TE-2-D-501/511	UM-2-D-501/511

[a] Each brine surge tank has a 3 to 5 hp agitator (see Section 3.2.1).

Table 4.2 Brine Feed Pump Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	4	4
Tag #(s)	BRA-PUMP-101/102	BRA-PUMP-101/102	BRA-PUMP-101/102/201/202	BRA-PUMP-101/102/201/202
Pump Type	Motor-Driven Centrifugal	Motor-Driven Centrifugal	Motor-Driven Centrifugal	Motor-Driven Centrifugal
Rated Flow/ Δ Pressure	50 gpm ΔP 37 psi	50 gpm ΔP 37 psi	23 gpm ΔP 25 psi	36 gpm ΔP 34 psi
Motor Power	5 hp	5 hp	2 hp	5 hp[a]
P&ID(s)	AN-2-D-501	PB-2-D-501	TE-2-D-501/511	UM-2-D-501/511

[a] Motor power based on vendor data sheets and does not match referenced design documentation.

4.1.2 Brine Evaporator Package

The primary components of the brine evaporator package are the brine heat exchanger, brine flash evaporator, a brine circulation pump and spare, a desuperheater pump, automatic control and block valves, and instrumentation. Design parameters for the brine flash evaporators are listed in Table 4.3.

Table 4.3 Brine Flash Evaporator Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	2	2
Tag #(s)	BRA-EVAP-101A	BRA-EVAP-101A	BRA-EVAP-101A/ BRA-EVAP-201A	BRA-EVAP-101A/ BRA-EVAP-201A
Size	5'6" I.D. 9'10.5" Height	5'6" I.D. 9'10.5" Height	4'6" I.D. 8'0" Height	4'6" I.D. 8'0" Height
Capacity (working vol.)	2400 gallon (900 gallons)	2400 gallon (900 gallons)	1200 gallon (450 gallons)	1200 gallon (450 gallons)
P&ID(s)	AN-2-D-502	PB-2-D-502	TE-2-D-502/512	UM-2-D-502/512

4.1.3 Drum Dryer Air Heater Package

The primary components of the drum dryer air heater package[1] are the drum dryer air heater (BRA-HEAT-110; BRA-HEAT-100 at TOCDF), volume and fire dampers, and instrumentation and controls. The drum dryer air heater package is a direct-fired air heater consisting of inlet and outlet dampers, a burner system, blowers, and instrumentation and controls. Design parameters associated with the drum dryer air heater package are listed in Table 4.4.

Table 4.4 Drum Dryer Air Heater[1] Package Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #(s)	BRA-HEAT-110	BRA-HEAT-110	BRA-HEAT-100	BRA-HEAT-110
Duty Rating	2.17 MM Btu/hr	2.47 MM Btu/hr	3.024 MM Btu/hr[1]	4.45 MM Btu/hr
Blower Capacity	15,545 acfm	21,000 acfm	30,000 scfm[1]	21,000 acfm
Motor Power	20 hp	20 hp	15 hp	20 hp
P&ID(s)	AN-2-D-507	PB-2-D-507	NA[1]	UM-2-D-507

[1] TOCDF's heater is called the BRA PAS air heater and is not shown on a P&ID. Design parameters are from the bill of materials in ECP TEMP-846-BRA package.

4.1.4 Brine Drum Dryer Package

The primary components of the brine drum dryer package are the drum dryer, automatic control and block valves, and instrumentation. Design parameters associated with the drum dryer package are listed in Table 4.5.

Table 4.5 Drum Dryer Package Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	3	3
Tag #(s)	BRA-DDYR-101/102	BRA-DDYR-101/102	BRA-DDYR-101/102/201	BRA-DDYR-101/102/201
Capacity	3300 lb/hr	3300 lb/hr	3300 lb/hr	3300 lb/hr
Drum Motor Power	25 hp	25 hp	25 hp	25 hp
Conveyor Motor Power	1 hp (each)	0.5 hp (each)	1 hp (each)	0.5 hp (each)
Pendulum Feed Motor Power	NA[a]	0.33 hp	NA[a]	0.33 hp
P&ID(s)	AN-2-D-503/504	PB-2-D-503/504	TE-2-D-503/504/513	UM-2-D-503/504/513

[a] ANCDF and TOCDF drum dryers do not have a pendulum feed system.

4.1.5 BRA Pollution Abatement System

The primary components of the brine reduction area pollution abatement system are the dryer knockout box, burner, combustion air blower, baghouses, exhaust blower, stack, automatic control and block valves, and instrumentation. Design parameters associated with the dryer knockout box, combustion air blower, baghouses, exhaust blower, and stack are listed in Tables 4.6 through 4.11.

Table 4.6 Dryer Knockout Box Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #(s)	BRA-SEPA-105	BRA-SEPA-105	BRA-SEPA-105	BRA-SEPA-105
Vibrator Motor Power	0.33 hp (each)	0.33 hp (each)	0.33 hp (each)	0.33 hp (each)
Airlock Motor Power	1.5 hp	1.5 hp	1.5 hp	1.5 hp
P&ID(s)	AN-2-D-505	PB-2-D-505	TE-2-D-505	UM-2-D-505

Table 4.7 BRA PAS Combustion Air Blower Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #	BRA-BLOW-101	BRA-BLOW-101	BRA-BLOW-101	BRA-BLOW-101
Blower Type	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal
Rated Flow	2350 acfm	2350 acfm	1686 acfm	1940 acfm
Motor Power	20 hp	20 hp	25 hp	25 hp
P&ID	AN-2-D-505	PB-2-D-505	TE-2-D-505	UM-2-D-505

Table 4.8 BRA PAS Burner Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #	BRA-BURN-110	BRA-BURN-110	BRA-BURN-110	BRA-BURN-110
Heat Output	10 MM Btu/hr	10 MM Btu/hr	10 MM Btu/hr	10 MM Btu/hr
Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas
P&ID	AN-2-D-505	PB-2-D-505	TE-2-D-505	UM-2-D-505

Table 4.9 BRA PAS Baghouse Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	3	3	4	4
Tag #(s)	BRA-SEPA-101 through –103	BRA-SEPA-101 through –103	BRA-SEPA-101 through –104	BRA-SEPA-101 through –104
Vibrator Motor Power	0.33 hp (each)	0.33 hp (each)	0.33 hp (each)	0.33 hp (each)
Airlock Motor Power	0.75 hp	0.75 hp	0.75 hp	0.75 hp
P&ID(s)	AN-27-D-501 Sheets 1 & 2	PB-27-D-501/503	TE-27-D-501 Sheets 1 & 2	UM-27-D-501 Sheets 1 & 2

Table 4.10 BRA PAS Exhaust Blower Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #	BRA-BLOW-102	BRA-BLOW-102	BRA-BLOW-102	BRA-BLOW-102
Blower Type	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal
Rated Flow/ Δ Pressure[1]	32,795 acfm 16.5 in. wc.	34,210 acfm 15.58 in. wc.	53,200 acfm 14 in. wc.	53,288 acfm 18.3 in. wc.
Motor Power	150 hp	150 hp	200 hp	200 hp
P&ID	AN-27-D-502	PB-27-D-502	TE-27-D-502	UM-27-D-502

Table 4.11 BRA PAS Stack Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #(s)	BRA-STAK-102	BRA-STAK-102	BRA-STAK-102	BRA-STAK-102
Size	70’ Height 3’0” ID at top 4’6” ID at bottom	70’ Height 3’0” ID at top 4’6” ID at bottom	65’ Height 4’6” ID at top	70’ Height 3’0” ID at top 4’6” ID at bottom
Construction	Carbon Steel w/ Internal Plasite Coating	Carbon Steel w/ Internal Plasite Coating	Carbon Steel	Carbon Steel w/ Internal Plasite Coating
P&ID(s)	AN-27-D-502	PB-27-D-502	TE-27-D-502	UM-27-D-502

4.2 EQUIPMENT POWER SOURCES

Table 4.12 lists the equipment power sources for the major equipment used in the BRA and BRA PAS based on the source documentation listed in Appendix H. Power sources are characterized as either critical, essential or utility. Critical loads are powered by the UPS panelboards and do not experience an interruption in power if offsite power is lost. Essential loads are required for safe shutdown of the facility, but can tolerate an interruption in power while being loaded on an onsite emergency diesel generator (EDG). Utility loads are not required if offsite power is lost and are not powered by the onsite EDG. Only motive power sources are listed in the tables; instrumentation and control power sources are not listed. In addition, hydraulically and pneumatically powered, and non-powered equipment are not included in the tables. Table 4.12 reflects implementation of ECPs that changed many of the BRA equipment power sources from utility to essential power (see FAWB Notes B-9 and B-16).

Table 4.12 BRA and BRA PAS Equipment Power Sources

Equipment Tag	Description	Site(s)	Power Source	Power Type
BRA-AGIT-101	Brine Surge Tank Agitator	AN/PB/TE/ UM	SPS-MCC-113	Utility
	Brine Surge Tank Agitator, Space Heater	AN/UM	SPS-PANB-129	Utility
		PB	SPS-PANB-131	Utility
BRA-AGIT-102	Brine Surge Tank Agitator	AN/PB/TE/ UM	SPS-MCC-114	Utility
	Brine Surge Tank Agitator, Space Heater	AN/UM	SPS-PANB-129	Utility
		PB	SPS-PANB-131	Utility
BRA-AGIT-201	Brine Surge Tank Agitator	TE/UM	SPS-MCC-113	Utility
	Brine Surge Tank Agitator, Space Heater	UM	SPS-PANB-129	Utility
BRA-AGIT-202	Brine Surge Tank Agitator	TE/UM	SPS-MCC-114	Utility
	Brine Surge Tank Agitator, Space Heater	UM	SPS-PANB-129	Utility
BRA-BLOW-101	BRA PAS Combustion Air Blower	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
BRA-BLOW-102	BRA PAS Exhaust Blower	AN/PB	SPS-MCC-114 → BRA-PANL-101	Utility
		TE/UM	SPS-SWGR-104 → BRA-PANL-103	Utility

Table 4.12 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
BRA-DDYR-101	Drum Dryer Package – Drum Dryer Drive Motor (A)	AN/PB/TE/ UM	SPS-MCC-113 → BRA-MCC-101	Essential[a]
	Drum Dryer Package – Conveyor Motor (C)	AN/PB/TE/ UM	SPS-MCC-113 → BRA-MCC-101	Essential[a]
	Drum Dryer Package – Conveyor Motor (D)	AN/PB/TE/ UM	SPS-MCC-113 → BRA-MCC-101	Essential[a]
	Drum Dryer Package – Pendulum Feed Motor (E)	PB/UM	SPS-MCC-113 → BRA-MCC-101	Essential[a]
BRA-DDYR-102	Drum Dryer Package – Drum Dryer Drive Motor (A)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-MCC-102	Essential[a]
	Drum Dryer Package – Conveyor Motor (C)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-MCC-102	Essential[a]
	Drum Dryer Package – Conveyor Motor (D)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-MCC-102	Essential[a]
	Drum Dryer Package – Pendulum Feed Motor (E)	PB/UM	SPS-MCC-114 → BRA-MCC-102	Essential[a]
BRA-DDYR-201	Drum Dryer Package – Drum Dryer Drive Motor (A)	TE/UM	SPS-MCC-113 → BRA-MCC-201	Essential[a]
	Drum Dryer Package – Conveyor Motor (C)	TE/UM	SPS-MCC-113 → BRA-MCC-201	Essential[a]
	Drum Dryer Package – Conveyor Motor (D)	TE/UM	SPS-MCC-113 → BRA-MCC-201	Essential[a]
	Drum Dryer Package – Pendulum Feed Motor (E)	UM	SPS-MCC-113 → BRA-MCC-201	Essential[a]
BRA-EVAP-101	Brine Evaporator Package, Brine Circulation Pump (C)	AN/PB/UM	SPS-MCC-113	Utility[b]
		TE	SPS-MCC-113	Essential[b]
	Brine Evaporator Package, Brine Circulation Pump (D)	AN/PB/UM	SPS-MCC-113	Utility[b]
		TE	SPS-MCC-113	Essential[b]
	Brine Evaporator Package, Brine Desuperheater Pump (E)	AN/PB/UM	SPS-MCC-113	Utility[b]
		TE	SPS-MCC-113	Essential[b]
BRA-EVAP-201	Brine Evaporator Package, Brine Circulation Pump (C)	UM	SPS-MCC-114	Utility[b]
		TE	SPS-MCC-114	Essential[b]

Table 4.12 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
BRA-EVAP-201 (cont'd)	Brine Evaporator Package, Brine Circulation Pump (D)	UM	SPS-MCC-114	Utility[b]
		TE	SPS-MCC-114	Essential[b]
	Brine Evaporator Package, Brine Desuperheater Pump (E)	UM	SPS-MCC-114	Utility[b]
		TE	SPS-MCC-114	Essential[b]
BRA-HEAT-100	BRA PAS Air Heater	TE	SPS-MCC-114	Utility
BRA-HEAT-110	Drum Dryer Air Heater	AN/PB/UM	SPS-MCC-114	Utility
BRA-PUMP-101	Brine Feed Pump	AN/PB/TE/ UM	SPS-MCC-113	Utility
BRA-PUMP-102	Brine Feed Pump	AN/PB/TE/ UM	SPS-MCC-114	Utility
BRA-PUMP-201	Brine Feed Pump	TE/UM	SPS-MCC-113	Utility
BRA-PUMP-202	Brine Feed Pump	TE/UM	SPS-MCC-114	Utility
BRA-PUMP-900	Brine Loading Pump	PB/TE	SPS-MCC-113	Utility
BRA-SEPA-101	BRA PAS Baghouse, heaters (BRA-HEAT-103A through H)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.1	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.2	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Airlock	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
BRA-SEPA-102	BRA PAS Baghouse, heaters (BRA-HEAT-104A through H)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.1	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.2	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Airlock	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
BRA-SEPA-103	BRA PAS Baghouse, heaters (BRA-HEAT-105A through H)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.1	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility

Table 4.12 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
BRA-SEPA-103 (cont'd)	BRA PAS Baghouse, Vibrator No.2	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Airlock	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
BRA-SEPA-104	BRA PAS Baghouse, heaters (BRA-HEAT-106A through H)	TE/UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.1	TE/UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Vibrator No.2	TE/UM	SPS-MCC-114 → BRA-PANL-101	Utility
	BRA PAS Baghouse, Airlock	TE/UM	SPS-MCC-114 → BRA-PANL-101	Utility
BRA-SEPA-105	Dryer Knockout Box, heaters (BRA-HEAT-102A through H)	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	Dryer Knockout Box, Vibrator No.1	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	Dryer Knockout Box, Vibrator No.2	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility
	Dryer Knockout Box, Airlock	AN/PB/TE/ UM	SPS-MCC-114 → BRA-PANL-101	Utility

[a] Essential load that is not automatically loaded on the EDG. BRA drum dyer drive motors are started manually by a local operator.

[b] Under ECP TEMP-2132-BRA R1, the power sources for BRA-EVAP-101/201 were changed from utility power to essential power. This change is under consideration for follow-on sites (see FAWB Note B-16).

APPENDIX A

Acronyms and Abbreviations

The acronyms and abbreviations listed below are common for all of the programmatic process FAWBs:

A&I	alarm and interlock matrix
AASS	automatic agent sampling system
ABCDF	Aberdeen Chemical Agent Disposal Facility
AC	alternating current
ACAMS	automatic continuous air monitoring system
acfm	actual cubic foot per minute
ACS	agent collection system
ACSWS	acid and caustic storage and wash system
ADC	air dilution controller
AgF	silver fluoride
AHT	agent holding tank
AHU	air handling unit
AMC	Army Materiel Command
ANAD	Anniston Army Depot (Alabama)
ANCDF	Anniston Chemical Agent Disposal Facility
ANSI	American National Standards Institute
AQS	agent quantification system
AR	Army Regulation
ASA	automatic submerged arc
ASC	allowable stack concentration
ASD	adjustable-speed drive
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	acid wash system
AWFCO	automatic waste feed cutoff
BCHS	bulk container handling system
BCS	bulk chemical storage
BDS	bulk drain station
BGCDF	Blue Grass Chemical Agent Disposal Facility
BLAD	blast load attenuation duct
BMS	burner management system
BPS	burster punch station (MIN)
BRA	brine reduction area
BRS	burster removal station (PMD)
BSA	buffer storage area
BSR	burster size reduction machine
Btu	British thermal unit
°C	degrees Celsius
CAMDS	Chemical Agent Munition Disposal System
CAB	combustion air blower
CAL	chemical assessment laboratory

CAS	compressed air system
CBR	chemical, biological, and radiological (filter)
CCB	configuration control board
CCS	central control system
CCTV	closed-circuit television
CDS	central decontamination supply
CDSS	central decontamination supply system
CDTF	Chemical Demilitarization Training Facility
CEHNC	U.S. Army Engineering & Support Center, Huntsville.
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHB	container handling building
CHWS	chilled water supply
CO	carbon monoxide (monitors/analyzers)
COM	communications system
CON	control room
COR	munitions corridor
CPA	client-Parsons authorization
CRO	control room operator
CRT	cathode ray tube
CS	crimp station (PMD)
CSS	campaign select screen
CSD	Chemical Stockpile Disposal (Project)
CV	control variable
CWC	Chemical Weapons Convention
CWS	chilled water supply
DAAMS	depot area air monitoring system
db	dry bulb
DC	direct current
DCD	Deseret Chemical Depot
DDESB	Department of Defense Explosives Safety Board
decon	decontamination (solution)
demil	demilitarization
DFS	deactivation furnace system
DICI	digital intercontroller communication input
DICO	digital intercontroller communication output
DMS	door monitoring system
DPE	demilitarization protective ensemble (suit)
DSA	DPE support area
dscf	dry standard cubic foot
DSIC	design and systems integration contractor
DUN	dunnage incinerator
E&M	engineering and maintenance
E-stop	emergency stop
EAC	equipment acquisition contractor
ECF	entry control facility
ECP	engineering change proposal
ECL	engineering control level
ECR	explosive containment room
ECV	explosive containment vestibule
EDG	emergency diesel generator

EHM	equipment hydraulic module
EIC	equipment installation contractor
EONC	enhanced onsite container
EPS	emergency power system
ETL	extreme temperature limit
°F	degrees Fahrenheit
FARS	fuzewell assembly (or adapter) removal station
FAWB	functional analysis workbook
FDLL	field design lessons learned (program)
FDPS	fire detection and prevention system
FEET	FAWB evolvement/evaluation team
FEM	fire extinguishing medium
FIFO	first-in-first-out
FIL	activated carbon and HEPA filter
FPD	flame photometric detector
fpm	feet per minute
FSSS	flame safety shutdown system
ft	feet
GA	general arrangement; nerve agent ethyl N-dimethylphosphoramidocyanidate ($C_5H_{11}N_2O_2P$)
gal	gallon
GB	nerve agent Sarin, isopropyl methyl phosphonofluoridate ($C_4H_{10}FO_2P$)
GC	gas chromatograph
GDL	gross detection level
GEN	emergency generator
GFE	government-furnished equipment
GLD	gross level detector
GPD	gas plasma display
gpm	gallons per minute
gr	grain
H	blister agent mustard, made by the Levinstein process, Bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S_{1.5}$ [empirical formula])
H_3PO_4	orthophosphoric acid
HCl	hydrochloric acid
HD	blister agent distilled mustard, Bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S$)
HDC	heated discharge conveyor
HDV	hydraulic directional control valve
HEPA	high-efficiency particulate air (filter)
HLE	high-level exposure
HOA	hand-off-auto
hp	horsepower
hr	hour
HRA	health risk assessment
HT	60% by weight blister agent distilled mustard and 40% agent T [Bis[2(2-chloroethylthio)ethyl] ether]
HVAC	heating, ventilating, and air-conditioning
HVC	heating, ventilating, and cooling
HYD	hydraulic power
HYPU	hydraulic power unit
HYVM	hydraulic control valve manifold

I/O	input/output
I-lock	interlock
IAS	instrument air system
icfm	inlet cubic foot per minute (acfm at the inlet)
ICS	instrumentation and control system
ID	induced draft
	inside diameter
IDLH	immediately dangerous to life and health
IGS	inertial gas sampling
in.	inch
in. wc.	inches water column
IR	infrared
ISO	International Standards Organization
JACADS	Johnston Atoll Chemical Agent Disposal System
kW	kilowatt
L	Lewisite (blister agent)
LAB	laboratory
lb	pound
lb/hr	pounds per hour
LCO	limiting condition of operation
ln	line
LIC	liquid incinerator
LIFO	last-in-first-out
LIT	level-indicating transmitter
LOQ	limit of quantification
LOR	local-off-remote
LPG	liquefied petroleum gas
LQAP	laboratory quality assurance plan
LQCP	laboratory quality control plan
LR	local-remote
LSB	LSS bottle filling system
LSS	life support system
LVS	low volume sampler
mA	milliamperes
MCC	motor control center
	mine component container
MCP	monitoring concept plan
MDB	munitions demilitarization building
MDM	multipurpose demilitarization machine
MEL	master equipment list
MER	mechanical equipment room
mg/m^3	milligrams per cubic meter
MIG	mine glovebox
MIN	mine machine
MMS	mine and munitions system
MPB	munitions processing bay
MPF	metal parts furnace
MPL	multiposition loader
	maximum permissible limit (for DPE)
MPRS	miscellaneous parts removal station (PMD)
MSB	monitor support building
MSS	munition sampling system

NaOCl	sodium hypochlorite
NaOH	sodium hydroxide
NCRS	nose closure removal station (PMD)
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NG	natural gas
NRT	near real time
O&M	operations and maintenance
OBV	observation corridor
ONC	onsite container
OS	orientation station (MIN)
OSHA	Occupational Safety and Health Administration
OVT	operational verification testing
P&A	precision and accuracy
P&ID	piping and instrument diagram
PA	public address
PAS	pollution abatement system
PBA	Pine Bluff Arsenal
PBCDF	Pine Bluff Chemical Agent Disposal Facility
PCS	primary cooling system
PCT	preconcentrator tube
PDAR(S)	process data acquisition and recording system
PDE	projectile deformation equipment
PDIT	pressure differential indicator transmitter
PDS	pull and drain station (MDM) punch and drain station (MIN)
PFD	process flow diagram
PFS	PAS filter system
pH	potential of hydrogen (a measure of acidity or alkalinity)
PHS	projectile handling system
PID	proportional integral derivative
pig	overpacked shipping container
PKPL	pick-and-place machine (also PPL)
PLA	plant air system
PLC	programmable logic controller
PLL	programmatic lessons learned (program)
PLS	proximity limit sensor/switch
PMB	personnel and maintenance building
PMCD	Program Manager for Chemical Demilitarization (formerly PEO-PM Cml Demil)
PMCSD	Project Manager for Chemical Stockpile Disposal
PMD	projectile/mortar disassembly (machine)
PML	personnel, maintenance, and laundry (complex or building)
POT	potable water
PPL	pick-and-place machine (also PKPL)
PPS	primary power system
PQAP	Participant Quality Assurance Plan
PRW	process water
PSB	process support building
psig	pounds per square inch, gauge
PSV	pressure safety valve
PUB	process and utility building

PUDA	Pueblo Depot Activity (Colorado)
PWR	power systems (unit substation, uninterruptible power supply, battery rooms, and emergency generator)
RCRA	Resource Conservation and Recovery Act
RDS	rocket drain station
RDTE	research, development, testing, and evaluation
RFI	Request for Information
RHA	residue handling area
RHS	rocket handling system
rpm	revolutions per minute
rps	revolutions per second
RSM	rocket shear machine
RSS	rocket shear station
SC	systems contractor
SCBA	self-contained breathing apparatus
scf	standard cubic foot
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SCW	secondary cooling water
SCT	systems contractor for training
SDS	spent decon system
sg	specific gravity
SGS	steam generation system
SOP	standing operating procedure
SPS	secondary power system
SRS	slag removal system
TBD	to be determined
TCE	treaty compliance equipment
TEAD	Tooele Army Depot (Utah)
TIP	tray information packet
TM	Army Technical Manual
TMA	toxic maintenance area
TNT	trinitrotoluene (explosive)
TOCDF	Tooele Chemical Agent Disposal Facility
TOX	toxic cubicle
TSCA	Toxic Substances Control Act
TSHS	toxic storage and handling system
TSO	Tight shutoff
TWA	time-weighted average
UE&C	United Engineers and Constructors
UMCDF	Umatilla Chemical Agent Disposal Facility
UPA	unpack area
UPS	uninterruptible power supply
UV	ultraviolet
VCR	video cassette recorder
VX	nerve agent, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate ($C_{11}H_{26}NO_2PS$)
wc	water column
WTS	water treatment system
XXX	3X level of decontamination
XXXXX	5X level of decontamination (minimum of 1000°F for 15 minutes)
Z	general designation for monitoring hazard level

APPENDIX B

FAWB Notes

Appendix B contains notes to expand upon the descriptions contained in the text of the FAWB. The notes include related experiences at the Johnston Atoll Chemical Agent Disposal System (JACADS).

B-1 Per discussions held during the comment resolution matrix meeting for the HVAC FAWB on 9-10-98, the programmatic process FAWBs are being prepared under the assumption that the DUN, DUN PAS and DUN PFS (at ANCDF) systems will not be used for processing at any of the four sites. Therefore, a programmatic process FAWB for the DUN/DUN PAS/PFS is not being developed. Handling and disposal of dunnage are considered site-specific activities that have not yet been determined. PBCDF deleted the DUN from the design by PBAC1000DUN. The DUN is installed at TOCDF and remains in the design at ANCDF. The RCRA and design package for the UMCDF DUN, DUN PAS, and DUN PFS were incorporated under post-construction design update package PC2.

B-2 Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the programmatic process FAWBs for the PAS and PFS have been combined into a single PAS/PFS FAWB that applies to ANCDF, PBCDF, TOCDF, and UMCDF.

B-3 The acid/caustic storage and wash system is no longer used at TOCDF and has been removed from the ANCDF, UMCDF, and PBCDF site designs by ECPs ANAC343PAS, R1, UMAC160PAS, R1, and PBAC340PAS, respectively.

B-4 UMCDF has approved ECP UMUF0518BRA to install piping to allow the WTS wastewater to be transferred to the brine surge tanks. UMCDF plans to process using this configuration, and will not send WTS wastewater directly to the evaporators or drum dryers as shown in the current design. Per ECP UMSF985BRA, the WTS wastewater feed lines to the drum dryers will be disconnected from the WTS system and converted into brine recirculation lines from the drum dryers back to the evaporators. These ECPs were presented at PLL ECP review meetings and are under review by PBCDF. The ECPs are not applicable to ANCDF or TOCDF (see below).

Per ECPs ANWP1239PMB and ANEC1289SRL, ANCDF will not be processing WTS regeneration wastewater in the BRA. ANAD has agreed to accept this wastewater for treatment in their sewage treatment plant. These ECPs were presented at a PLL ECP review meeting and considered to be site specific.

TOCDF discontinued processing WTS wastewater in the BRA in 1998. Instead, they pump WTS wastewater from the regeneration waste surge tank to a large "Frac Tank" for holding until it gets transferred to a tanker truck for offsite disposal.

B-5 In June 1998, TOCDF suspended BRA operations and temporarily put the BRA in lay-up status due to the ability to economically ship liquid brine offsite rather than process it onsite. The BRA may be placed back in service if the offsite option is no longer favorable. Currently, brine is collected in the brine surge tanks and held prior to discharge to tanker trucks for disposal offsite. Descriptions of BRA evaporator, drum dryer, and BRA PAS operations at TOCDF reflect the operating configuration prior to shutdown and have been included in order to capture any modifications that could provide a basis for enhanced operations at the follow-on sites. To support tanker loading, ECP TEMP-2407-BRA relocated the HCL unloading pump to the BRA, and relocated and installed the necessary piping to pump the brine to the loading dock outside the double-fenced area.

ANCDF has issued ECP ANWF1078SRL to suspend operations in the BRA and implement changes to transfer brine from BRA-TANK-101/102 to tanker trucks in the truck unloading station. This ECP has not yet been implemented into the design drawings.

At PBCDF, ECP PBAC1006BRA R2 adds a brine loading system to allow pumping of brine to a tanker truck for offsite disposal. The system is provided as a backup to the BRA. A future revision to the BRA FAWB will describe which method is used at PBCDF.

B-6 The design basis specific gravity limit for brine sent from the evaporators to the dryers was set at 1.2 sg in order to prevent salt precipitation. TOCDF had been able to run with a specific gravity as high as 1.29, thereby increasing the system efficiency and throughput. They did, however, experience some clogging during system upset and added quick disconnects to facilitate unplugging the piping manually. At follow-on sites, the RCRA limit for specific gravity is 1.25. UMCDF has indicated that they may limit the specific gravity to approximately 1.13 to prevent piping from plugging.

B-7 Under TEMP-1518-BRA, TOCDF replaced the brine surge tank differential pressure level transmitters with ultrasonic level transmitters. Subsequently, under ECP TEMP-2158-BRA, R1, TOCDF installed temperature-compensated ultrasonic level transmitters. ECPs ANAC0331SRL, UMAC0149SRL, and PBAC0335SRL implemented the change to ultrasonic level transmitters based on ECP TEMP-1518-BRA. The FDLL reviewed TEMP-2158-BRA, R1 and recommended the modification for implementation by the systems contractors at each follow-on site.

B-8 Under ECP TEMP-806-BRA, TOCDF replaced the single mechanical seals for the brine surge tank agitator with double mechanical seals with provisions for observing seal breakdown. If flow is observed through the flow indicator, the inner seal has begun to break down. ECPs ANAC0179SRL, UMAC0059SRL, and PBAC0243SRL implemented similar design modifications at follow-on sites.

B-9 The initial design operated the brine surge tank inlet valves from utility power. This condition caused the valves to fail to their closed positions during a power outage which resulted in the loss of a tank in which to dump PAS brine. Under TOCDF ECP 2526 (TEMP-2019-BRA), BRA Control Panels, ICS-PANL 104 & 111, were placed on essential power to allow the tank inlet valves as well as indicators, interlocks, and alarms to continue functioning. This modification has been implemented by ECPs ANAC481SRL, UMAC209SRL, and PBAC412SRL for the follow-on sites.

B-10 Under ECP TEMP-829-BRA, TOCDF replaced the original rope packing seals for the brine feed pumps with double mechanical seals with provisions for closed-looped cooling provided from a water-filled head tank. The original design routed water directly into the process resulting in an increase in the amount of brine processed. ECPs ANAC0179SRL, UMAC0059SRL, and PBAC0243SRL implemented similar design modifications at follow-on sites.

B-11 Under ECP TEMP-699-BRA, TOCDF installed recirculation lines from the brine evaporator packages to the brine surge tanks. The DSIC implemented similar changes at the follow-on sites under ECPs ANAP0187PUB, PBAP0250PUB, and UMAP0065PUB. The TOCDF modification included the addition of flow totalizers, 23-FQI-837, -831 (flow into and out of evaporator package 101), and 23-FQI-835, -889 (flow into and out of evaporator package 201). These totalizers were added for information only at TOCDF, and they are not in the design for the follow-on sites.

B-12 At TOCDF, the coating on the brine flash chamber failed after a short period of service. Extensive corrosion of the vessel walls resulted in the replacement of both carbon steel-lined vessels with new vessels fabricated from Hastelloy C22 [ECP TEMP-2187-BRA]. The FDLL reviewed the ECP and deferred a recommendation for follow-on sites until TOCDF gained operating experience with the Hastelloy vessel. Since TOCDF is no longer running the BRA, follow-on sites have the original lined, carbon-steel vessel.

B-13 Under TOCDF ECP EN-2468 (ECP TEMP-1999-BRA), the original brine circulation pump cooling system at TOCDF was replaced with a closed-loop cooling system using a pressurized head tank. The original mechanical seal scheme routed water directly into the process resulting in an increase in the amount of brine to be processed. The original seals were modified to include thrusters for moving the cooling medium. Due to the high temperatures of the

brine, a forced-convection, air-fin cooler was added to cool the cooling medium (Royal Purple). The FDLL reviewed the ECP and deferred a recommendation for follow-on sites until TOCDF gained operating experience with the revised cooling system. While the FDLL never gave formal direction to incorporate the TOCDF modifications, the vendor modified the design for the follow-on sites to incorporate an external pump seal and a brine circulation pump heat exchanger cooled by natural convection, not forced air. These changes were incorporated under ECPs ANAP341SRL, UMAC158SRL, PBAC338SRL, ANAP740EVP, UMAP641EVP, and PBAP601EVP.

B-14 Under ECP TEMP-1547-BRA, TOCDF installed a positive pressure condensate pumping system, which consists of two parallel tanks that alternately collect condensate from the heat exchanger through gravity drains. When the level in a tank reaches a predetermined level, the 3-way collection valve stops condensate flow and introduces high-pressure steam for "pumping" the condensate to the deaerator. During the pumping operation, the alternate tank is automatically placed in service. The 3-way collection valve "equalizes" system pressure by allowing the pumping steam pressure to vent to the system so condensate can once again flow to the tank. This change was implemented to address problems encountered in the original design configuration. The original heat exchanger low-pressure condensate system routed condensate from the heat exchanger, along with condensate from the steam supply traps, to the deaerator low-pressure dome sparge tube using system pressure as the motive force. There was not adequate pressure in the heat exchanger to overcome system backpressure and remove the condensate. This resulted in condensate buildup in the heat exchanger, reducing heat transfer and causing plate fouling. The FDLL reviewed this ECP and recommended that follow-on sites review it for potential incorporation.

B-15 Under ECPs TEMP-1502-BRA and TOEN 2844, TOCDF added density controllers and automatic valves to maintain constant flow from the evaporator packages. ECP PBAC0471SRL added a flow controller at PBCDF to maintain constant flow from the evaporators. This change also was prepared in ECPs ANAC0532SRL and UMAC0385SRL for ANCDF and UMCDF, respectively. ANCDF has not implemented this change because they plan to ship brine offsite (see FAWB Note B-5). UMCDF has stated that they will not implement this change unless operating problems arise that require its implementation.

B-16 Under TOCDF ECP EN-2736 R1 (ECP TEMP-2132-BRA R1), the power sources for BRA-DDYR-101/102/201 and BRA-EVAP-101/102 were changed from utility power to essential power. The FDLL reviewed R0 of the ECP, which implemented the drum dryer power source change, and required a similar change at the follow-on sites. The drum dryer power source change was implemented at follow-on sites by ANAC0509SRL, PBAP0445SRL, and UMAC0363SRL. R1 of the ECP also was reviewed by the FDLL. The FDLL recommended that the

DSIC implement the modification for follow-on sites after reviewing to ensure that the onsite emergency diesel generators would not be overloaded by the additional load. The DSIC has found that they did not have a complete reference copy of ECP TEMP2132BRA, R1, and was unaware of the brine circulating pump loads when preparing PC-15147, in response to FDLL 98-03 action items. Therefore, the brine circulating pumps power source was not changed from utility to essential power. In addition, the DSIC did not consider the brine circulation pumps as essential loads under the Essential Power Loading Studies (ref: PC-15601, -15607, & -15608). The DSIC reviewed the complete R1 ECP from TOCDF in response to RFI C-UMCDF-004R1 and determined that these power feeds can be placed on the essential power bus. The loads should not autostart. Instead a local operator should start the pumps only if needed after load priority 6. The DSIC is initiating an ECP for ANCDF, PBCDF, and UMCDF to move the BRA-EVAP-101 [102] loads from utility to essential power.

B-17 Under ECP TEMP-790-BRA, TOCDF replaced the capacitance-type sensor that measured the depth of brine in the drum dryer nip with a bubbler-type sensor. The capacitance-type sensor would become coated with brine and produce incorrect readings. The FDLL reviewed this ECP and recommended that follow-on sites review it for potential incorporation.

B-18 The referenced follow-on site P&IDs show local flow indication only for 23-FIT-851, -872, and –903 (UMCDF only), which indicate the flow rate to each drum dryer. The January 2002 control code for UMCDF has the brine flow rate to each drum dryer displayed in the CON and reporting to PDAR. The EIC has indicated that ANCDF and PBCDF will also have the brine flow rate to each drum dryer displayed in the CON and reporting to PDAR. The site systems contractors will revise the P&IDs to match the control code configuration.

B-19 Under ECP TEMP-2122-BRA, TOCDF revised the original drum dryer brine feed piping configuration by installing three two-inch spray pipes inside the dryer housing above the drums. In the original configuration, brine feed was sent through a two-inch pipe, which was offset over a single drum to distribute the feed. Another one-inch pipe, offset over the other drum, was dedicated to waste water feed. In the revised configuration, one pipe is directly over the nip area and has 1/4-inch diameter spray holes spaced 92 inches apart. Two other pipes are offset six inches from the center, with one pipe over each of the two drums. These have 1/8-inch diameter spray holes spaced 12 inches apart. Each of the three pipes can feed brine from the evaporators or waste water directly from the WTS. Each of the spray pipes has a connection to 135-psig steam to blow out the spray holes. The FDLL reviewed this ECP and recommended that ANCDF review it for potential incorporation. The ECP does not apply to PBCDF and UMCDF since they have pendulum feed systems for the drum dryers.

B-20 Originally, a pressure regulator controlled the pressure of the steam to the drum dryers. Because drum dryer pressure requirements are a function of the brine feed rate, the regulator required frequent adjustment. To facilitate adjustment of steam supply pressure, the pressure regulator was replaced with a pressure controller and control valve. This change was implemented by the following ECPs: ANAC0212SRL, PBAC0269SRL, TEMP1000BRA, UMAC0085SRL.

B-21 Under ECP TEMP-2207-BRA, R1, TOCDF cut access holes in the sides of the drum dryer conveyors to facilitate cleaning and adjusting the belt. Each hole is fitted with a closure plate. Frequent cleaning is required to prevent salt residue buildup that was causing the belt to bind, which damaged the belt, belt rollers, and drive motors. The FDLL reviewed this ECP and determined that the change was site-specific.

B-22 Under ECP TEMP-907-BRA, TOCDF added a discharge shroud to the drum dryer conveyors to route the salts from the conveyor into the collection bins. The Equipment Acquisition Contractor captured this modification for follow-on sites.

B-23 Under ECPs TEMP-1545-BRA and TEMP-2123-BRA, TOCDF modified the high-pressure condensate system and deaerator. The original high-pressure condensate system with routing directly to the boilers was eliminated and replaced with a positive pressure condensate pumping system, which routes the drum dryer condensate to the deaerator through a sparging tube. The original deaerator design provided two feed water pumps, which functioned as a primary and backup. The added capacity of the high-pressure condensate required that both feed water pumps be operated in order to supply the required boiler feed water. The piping between the deaerator and boiler was reworked to provide a parallel path from both pumps to either a single boiler or one pump to each boiler. In addition, the added capacity of condensate from all three dryers operating simultaneously caused condensate to flash in the deaerator, which caused the pressure relief valve (PSV) to open. Since the PSV should not be used during normal operation, a backpressure control valve was added with a dedicated atmospheric vent to balance the deaerator pressure. The FDLL reviewed each of these ECPs and recommended that follow-on sites review TEMP-1545-BRA for potential incorporation. TEMP-2123-BRA was considered site specific because of the unique configuration at TOCDF.

B-24 Based on the requirements of the RCRA Tank Assessment, PC-16343, November 22, 1999, the BRA sump pumps should always be started and stopped manually by the local handswitch. The option of starting the pumps automatically by the high-high level switch should not be used because the sump liquid should be tested for brine content before determining the destination of the liquid. The DSIC has indicated that the follow-on site BRA sump pumps are not to be operated in AUTO mode, and must be operated manually. The AUTO mode, however, remains in the design. Therefore, the site SCs must either modify the controls for

the pumps or provide administrative controls to prevent the pumps from operating automatically.

B-25 Under TOCDF ECP EN-2043 (ECP TEMP-1769-BRA), a turbine meter (fuel gas totalizer) was added on the natural gas line to the BRA PAS burner (BRA-BURN-110) in order to meet an environmental permit limitation not to exceed 88 million standard cubic feet of fuel per revolving annual basis. The FDLL reviewed the ECP and deferred a recommendation pending a review of the permit requirements for follow-on sites.

B-26 Under TOCDF ECP EN-3009 (ECP TEMP-2195-BRA), a number of changes to the BRA PAS configuration were made including the following: 1) The BRA PAS filter bypass damper has been mechanically and electrically disabled because a leak at the damper is suspected to have been a contributor to the failure of the particulate matter compliance test, 2) The evaporator exhaust dampers have been mechanically and electrically disabled because these ducts are used for continual flow and the dampers never need to be closed, 3) The drum dryer exhaust dampers have been mechanically and electrically disabled because these dampers get fouled with salt and contribute to system down time, 4) The Gore-Tex filter bags were going to be replaced with Nomex bags. The FDLL reviewed the ECP and deferred a recommendation to await TOCDF experience operating with the modifications.

B-27 TOCDF eliminated the requirement for ASC ACAMS or DAAMS monitoring of the BRA due to verification that the brine is agent free prior to processing in the BRA [TOCDF ECP TEMP-1605-BRA]. The FDLL reviewed the TOCDF ECP and considered the modification to be site specific. The PMCD Environmental and Monitoring Office (EMO) reviewed the modification to determine if a programmatic change would be made. The EMO recommendation stated that the CSD site laboratories must have the ability to monitor with ACAMS and DAAMS on the BRA stack as a redundant measure (redundant to the extraction procedure of the brine process to determine presence of chemical agent). Based on this recommendation, ACAMS-152 remains in the design for ANCDF, PBCDF, and UMCDF as the ACAMS BRA stack monitor. The RCRA permits for these sites also include the requirement for ACAMS/DAAMS monitoring of the BRA stack.

B-28 In December 1999, meetings were held at UMCDF to resolve discrepancies between the UMCDF RCRA permit AWFCOs and the design documentation. As a result of these meetings, ECP UMAP813BRA was issued and approved to add and modify a number of alarms, interlocks, logic and instrumentation. The new and modified alarms are not in the ANCDF, PBCDF, and TOCDF A&I matrices. A RCRA AWFCO is defined as a shutdown of the brine feed pumps. The following is a summary of the alarm and interlock changes that were made, listed by UMCDF RCRA permit AWFCO number:

BRA 07: 23-DSHH-834/887, Brine Evaporator Recirculation Specific Gravity High-High. DSHH alarms were added to the design as the AWFCOs. 23-DSH-834/887 is a prealarm with a setpoint of 1.20 sg. The setpoint for 23-DSHH-834/887 is 1.25 sg.

BRA 08: 23-DSLL-834/887, Brine Evaporator Recirculation Specific Gravity Low-Low. DSL and DSLL alarms were added to the design. 23-DSL-834/887 is a prealarm with a setpoint of 1.06 sg. 23-DSLL-834/887 is the AWFCO with a setpoint of 1.05 sg.

BRA 09: 23-TISHH-110, Brine Temperature into Drum Dryer High-High. TISHH alarm was added to the design as the AWFCO. 23-TISH-110 is a prealarm with a setpoint of 240°F. The setpoint for 23-TISHH-110 is 250°F (unchanged from permit value).

BRA 10: 23-FQAHH-042, Total Brine Feed Rate the Three Drum Dryers High-High. FQAHH alarm was added to the design as an AWFCO with a setpoint 1080 gph, rolling hourly average. The DSCI has recommended a setpoint of 972 lb/hr for the prealarm, 23-FQAH-042.

BRA 11: 27-TAHH-172, Temperature of Exhaust Gas to Baghouse High-High. TAHH and TAHHH alarms were added to the design. 27-TAH-172 is a prealarm with a setpoint of 270°F. 27-TAHH-172 is the AWFCO with a setpoint of 275°F. 27-TAHHH-172 is the baghouse shutdown alarm with a setpoint of 280°F.

BRA 12: 27-PDAHH-143/144/145/186, Differential Pressure of the Baghouse High-High. PDAHH alarms were added to the design as the AWFCOs. 27-PDAH-143/144/145/186 are prealarms with setpoints of 11 in. wc. The setpoints for 27-PDAHH-143/144/145/186 are 12 in. wc.

BRA 13: 27-PDALL-143/144/145/186, Differential Pressure of the Baghouse Low-Low. PDAL alarms were added to the design as prealarms. 27-PDAL-143/144/145/186 setpoints are 0.5 in. wc. 27-PDALL-143/144/145/186 are the AWFCOs with setpoints of 0.3 in. wc.

BRA 16: 27-ZS-130B, BRA PAS Baghouse Valve Not Closed. 27-ZS-130B is listed in the A&I matrix as an AWFCO to be consistent with the RCRA permit.

B-29 Under ECP TEMP-1704-BRA, TOCDF modified the BRA and BRA PAS interlocks and automatic waste feed cutoffs. ECPs ANAC0389SRL, UMAC0180SRL, and PBAC0356SRL implemented similar design modifications at follow-on sites.

APPENDIX C

Alarm and Interlock Matrices

Appendix C contains alarm and interlock (A&I) matrices for ANCDF, PBCDF, TOCDF, and UMCDF. A&I matrices depict in a consolidated format the software and hardware alarms and interlocks for the equipment and instrumentation in a specific system. For the BRA, the following 10 site-specific A&I matrices are included:

(1) ANCDF BRA
(2) ANCDF BRA PAS
(3) PBCDF BRA
(4) PBCDF BRA PAS
(5) TOCDF BRA Line 1 & Common Equipment
(6) TOCDF Line 2
(7) TOCDF BRA PAS
(8) UMCDF BRA Line 1 & Common Equipment
(9) UMCDF Line 2
(10) UMCDF BRA PAS

Specific guidelines were developed during development of utility system FAWBs for ANCDF and UMCDF that have been followed in the programmatic FAWBs. Fourteen specific guidelines have been established that define the format and content of entries in the A&I matrices:

1. Analog signals from transmitters (e.g., LITs) are not listed; the alarms are indicated separately.
2. All software prealarms and alarms (e.g., LAHs) that are indicated in the CON are listed. Setpoints and actions are shown where applicable.
3. Equipment and instrument status indication signals (e.g., open/close, on/off) are not listed unless they initiate action.
4. Alarms generated from GFE package units that report to the PLC are listed. If not already available and listed, the GFE internal alarms and actions will be added to the matrix when available from the site systems contractor and "*SC to provide detail"* will be entered into the "remarks" column.
5. For field switch generated alarms, the switch tag is listed, not the alarm tag. For example, a low-low pressure alarm (PALL) generated by the field switch, 13-PSLL-008, is listed as 13-PSLL-008 rather than 13-PALL-008. The purpose for this listing is to distinguish between field switch generated hardwired alarms and alarms generated in the software based on the analog output from a transmitter.

6. Instruments that initiate actions are listed in a vertical column sorted by prefix, loop number, instrument ID, then suffix. For example, for 99-TSH-100A, the prefix is 99, the loop number is 100, the instrument ID is TSH, and the suffix is A). Actions are listed in column across the top of the matrix and include prealarms and alarms.

7. Setpoints are listed for all instruments where applicable. Instrument ranges for analog transmitters are shown in Appendix F. Unless otherwise noted, tank level setpoints are shown from the level transmitter tap.

8. Only hand switches (push buttons) that cause system shutdowns are listed; other software and hardwired hand switches are not listed.

9. Local alarms are not listed[1].

10. Matrices are grouped by subsystem as applicable within each FAWB. For example, separate matrices are provided in the RHS FAWB for the rocket input feed assembly, the rocket drain station of the RSM, and the rocket shear station of the RSM.

11. Alarms associated with automatic actions are classified as *"alarms"* and alarms without automatic actions are classified as *"prealarms."*

12. Instruments listed in the matrix that are RCRA reportable are designated as such by entering *"RCRA"* in the Remarks column.

13. Clarifications are provided when necessary in the remarks column of the A&I matrices, or in the system and/or operator response column in alarm and system response tables.

14. Device malfunction alarms are not shown unless they initiate automatic actions such as equipment switchovers (e.g., to a standby pump), system shutdowns, or a stop feed signal.

[1] For the BRA system, local alarms are listed because a significant portion of the BRA is operated locally.

ANNISTON CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX
(SEE NOTE 1 AND FAWB NOTE B-5)
BRINE REDUCTION AREA

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: AN-2-D-501, -502, -503, -504, -507
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	08 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	09 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	10 START BRA-PUMP-103 SUMP PUMP	11 START BRA-PUMP-104 SUMP PUMP	12 CLOSE 23-LV-757B, WATER SOFTENER WASTE WATER	13 PRE-ALARM	14 ALARM	REMARKS
1	23-LSHH-002	BRA-TANK-101 BRINE SURGE TANK HIGH HIGH	18' 3"	X													X	HARDWIRED. LOCAL AND CON ALARM
2	23-LSHH-02/06	BRINE SURGE TANKS 101, 102 BOTH LEVELS HIGH-HIGH	18' 3"														X	RCRA AWFCO DFS-27, LIC-24, MPF-24. DICO TO DFS/LIC/MPF TO STOP FEED. NOTE: CODE ALSO HAS STOP FEED IF ONE TANK IS HIGH-HIGH AND THE OTHER IS SELECTED FOR FEED TO BRA.
3	23-LAH-003A	BRA-TANK-101 BRINE SURGE TANK HIGH	16' 11"	X													X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. SP FROM NOV 2001 CODE.
4	23-LAL-003A	BRA-TANK-101 BRINE SURGE TANK LOW	3' 6"													X		CON ALARM ONLY.
5	23-LSH-003B	BRA-TANK-101 BRINE SURGE TANK HIGH	17' 9"													X		LOCAL ALARM ONLY.
6	23-LSL-003B	BRA-TANK-101 BRINE SURGE TANK LOW	3' 6"													X		LOCAL ALARM ONLY.
7	23-LSLLL-004	BRA-TANK-101 BRINE SURGE TANK LOW LOW LOW	1' 3"			X			X								X	HARDWIRED. CON ALARM ONLY. SEE NOTE 2.
8	23-LSHH-006	BRA-TANK-102 BRINE SURGE TANK HIGH HIGH	18' 3"				X										X	HARDWIRED. LOCAL AND CON ALARM
9	23-LAH-007A	BRA-TANK-102 BRINE SURGE TANK HIGH	16' 11"				X										X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. SP FROM NOV 2001 CODE.
10	23-LAL-007A	BRA-TANK-102 BRINE SURGE TANK LOW	3' 6"													X		CON ALARM ONLY.
11	23-LSH-007B	BRA-TANK-102 BRINE SURGE TANK HIGH	17' 9"													X		LOCAL ALARM ONLY.
12	23-LSL-007B	BRA-TANK-102 BRINE SURGE TANK LOW	3' 6"													X		LOCAL ALARM ONLY.
13	23-LSLLL-008	BRA-TANK-102 BRINE SURGE TANK LOW LOW LOW	1' 3"			X			X								X	HARDWIRED. CON ALARM ONLY. SEE NOTE 2.
14	23-LSH-025	BRINE STORAGE AREA SUMP LEVEL HIGH	0.25 in. from bottom														X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL (SEE FAWB NOTE B-24).
15	23-LSHH-025	BRINE STORAGE AREA SUMP LEVEL HIGH-HIGH	6" from top										X				X	CON ALARM ONLY (SEE FAWB NOTE B-24).
16	23-LSLL-029	BRA-TANK-101 BRINE SURGE TANK LOW LOW	3' 0"		X												X	HARDWIRED. LOCAL ALARM ONLY.
17	23-LSLL-032	BRA-TANK-102 BRINE SURGE TANK LOW LOW	3' 0"				X										X	HARDWIRED. LOCAL ALARM ONLY.
18	23-ZS-038B	BRA-TANK-101 DISCH VALVE CLOSED	CLOSED			X			X									HARDWIRED
19	23-ZS-040B	BRA-TANK-102 DISCH VALVE CLOSED	CLOSED			X			X									HARDWIRED
20	23-FQAH-042	BRA-EVAP-101 TO ALL DRUM DRYERS FLOW HIGH	33,423 lb/hr														X	RCRA AWFCO BRA-10. CON ALARM ONLY. SETPOINT FROM RCRA PERMIT.
21	23-TISH-110	BRA-EVAP-101 TO DRUM DRYERS TEMP HIGH	230 F														X	CON ALARM ONLY. SETPOINT FROM INSTRUMENT DATA SHEET. RCRA AWFCO BRA 9 SETPOINT IS 250 F.
22	23-XA-115	SHUTDOWN FROM BRA-PANL-101	SHUTDOWN			X			X	X				X			X	LOCAL ALARM ONLY. ALSO CLOSE 23-XV-935 (PROCESS WATER) AND BRINE FEED PUMP SUCTION VALVES 23-XV-38/40 AND RECIRCULATION VALVES 23-XV-37/39.
23	23-PSH-168	BRA-PUMP-101 SEAL POT AIR SUPPLY PRESS HIGH	NOTE 3													X		LOCAL ALARM ONLY.
24	23-XS-170	BRA-DDYR-101 COMMON TROUBLE	NA														X	CON ALARM ONLY.
25	23-PSH-171	BRA-PUMP-102 SEAL POT AIR SUPPLY PRESS HIGH	NOTE 3													X		LOCAL ALARM ONLY.
26	23-LSH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH	0.25 in. from bottom														X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL (SEE FAWB NOTE B-24).
27	23-LSHH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH-HIGH	6" from top											X			X	CON ALARM ONLY (SEE FAWB NOTE B-24).

ANNISTON CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX
(SEE NOTE 1 AND FAWB NOTE B-5)
BRINE REDUCTION AREA

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: AN-2-D-501, -502, -503, -504, -507
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	08 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	09 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	10 START BRA-PUMP-103 SUMP PUMP	11 START BRA-PUMP-104 SUMP PUMP	12 CLOSE 23-LV-757B, WATER SOFTENER WASTE WATER	13 PRE-ALARM	14 ALARM	REMARKS
28	23-XS-175	BRA-DDYR-102 COMMON TROUBLE	NA														X	CON ALARM ONLY.
29	23-LSL-177	BRA-PUMP-101 SEAL POT LEVEL LOW	NOTE 3													X		LOCAL ALARM ONLY.
30	23-LSL-178	BRA-PUMP-102 SEAL POT LEVEL LOW	NOTE 3													X		LOCAL ALARM ONLY.
31	23-PSH-190	BRA-HEAT-110 DRM DRYER AIR HEATER DISCH PRESS HIGH	NOTE 3								X						X	CON ALARM ONLY.
32	23-XA-190	BRA-HEAT-110 DRM DRYER AIR HEATER MALF	MALF													X		CON ALARM ONLY.
33	23-TAH-267	BRA-TANK-101 TEMPERATURE HIGH	NOTE 3													X		CON ALARM ONLY.
34	23-TAL-267	BRA-TANK-101 TEMPERATURE LOW	NOTE 3													X		CON ALARM ONLY.
35	23-TAH-268	BRA-TANK-102 TEMPERATURE HIGH	NOTE 3													X		CON ALARM ONLY.
36	23-TAL-268	BRA-TANK-102 TEMPERATURE LOW	NOTE 3													X		CON ALARM ONLY.
37	23-LSH-757	BRA-EVAP-101A LEVEL HIGH	80%													X		LOCAL AND CON ALARM
38	23-LSHH-757	BRA-EVAP-101A LEVEL HIGH-HIGH	90%			X			X						X		X	LOCAL & CON ALARM. SEE FAWB NOTE B-4.
39	23-LSL-757	BRA-EVAP-101A LEVEL LOW	25%													X		LOCAL AND CON ALARM
40	23-LSLL-757	BRA-EVAP-101A LEVEL LOW-LOW	15%							X							X	LOCAL AND CON ALARM
41	23-LSH-758	BRA-DDYR-101 LEVEL HIGH	NOTE 3													X		LOCAL ALARM ONLY.
42	23-LSHH-758	BRA-DDYR-101 LEVEL HIGH-HIGH	10 in														X	S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR. SETPOINT PER VENDOR DATA.
43	23-LSL-758	BRA-DDYR-101 LEVEL LOW	NOTE 3													X		LOCAL ALARM ONLY.
44	23-LSH-759	BRA-DDYR-102 LEVEL HIGH	NOTE 3													X		LOCAL ALARM ONLY.
45	23-LSHH-759	BRA-DDYR-102 LEVEL HIGH-HIGH	10 in														X	S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR. SETPOINT PER VENDOR DATA.
46	23-LSL-759	BRA-DDYR-102 LEVEL LOW	NOTE 3													X		LOCAL ALARM ONLY.
47	23-PSL-821	BRA-DDYR-101 STEAM SUPPLY PRESSURE LOW	70 psig													X		LOCAL AND CON ALARM. SP BASED ON TOCDF. VENDOR DATA SHOWS 7 PSIG SP. PER DSIC, SP SHOULD BE 70 PSIG. SC TO VERIFY.
48	23-PSL-822	BRA-DDYR-102 STEAM SUPPLY PRESSURE LOW	70 psig													X		LOCAL AND CON ALARM. SP BASED ON TOCDF. VENDOR DATA SHOWS 7 PSIG SP. PER DSIC, SP SHOULD BE 70 PSIG. SC TO VERIFY.
49	23-XS-827	BRA-EVAP-101 LOCAL CONTROL PANEL COMMON TROUBLE	NA													X		CON ALARM ONLY.
50	23-PDISH-828	BRA-PUMP-101 INLET STRAINER DIFF PRESS HIGH	1 psi													X		LOCAL ALARM ONLY. SETPOINT FROM INSTRUMENT DATA SHEET.
51	23-PDISH-829	BRA-PUMP-102 INLET STRAINER DIFF PRESS HIGH	1 psi													X		LOCAL ALARM ONLY. SETPOINT FROM INSTRUMENT DATA SHEET.
52	23-DSH-834	BRA-EVAP-101A RECIRC DENSITY HIGH	1.25 sg														X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 07 (SEE FAWB NOTE B-6).
53	23-ZS-834	BRA-EVAP-101A STEAM SUPPLY VALVE POSITION	CLOSED								X							
54	23-TSH-836	BRA-EVAP-101A RECIRC TEMP HIGH	NOTE 3													X		CON ALARM ONLY.
55	23-FSH-837	BRA-EVAP-101A FLOW FROM BRA-PUMP-101/102 HIGH	NOTE 3													X		CON ALARM ONLY.
56	23-LSL-840	BRA-EVAP-101C (CIRC PUMP) SEAL POT LEVEL LOW	NOTE 3													X		LOCAL ALARM ONLY.
57	23-PSH-840	BRA-EVAP-101C (CIRC PUMP) SEAL POT PRESS HIGH	35 psig													X		LOCAL ALARM ONLY. SP PER VENDOR DATA.
58	23-ISH-843	BRA-EVAP-101C (CIRC PUMP) CURRENT HIGH	NOTE 3													X		LOCAL ALARM ONLY.
59	23-LSL-844	BRA-EVAP-101D (CIRC PUMP) SEAL POT LEVEL LOW	NOTE 3													X		LOCAL ALARM ONLY.
60	23-PSH-844	BRA-EVAP-101D (CIRC PUMP) SEAL POT PRESS HIGH	35 psig													X		LOCAL ALARM ONLY. SP PER VENDOR DATA.

ANNISTON CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX
(SEE NOTE 1 AND FAWB NOTE B-5)
BRINE REDUCTION AREA

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: AN-2-D-501, -502, -503, -504, -507
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	08 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	09 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	10 START BRA-PUMP-103 SUMP PUMP	11 START BRA-PUMP-104 SUMP PUMP	12 CLOSE 23-LV-757B, WATER SOFTENER WASTE WATER	13 PRE-ALARM	14 ALARM	REMARKS
61	23-ISH-846	BRA-EVAP-101D (CIRC PUMP) CURRENT HIGH	NOTE 3													X		LOCAL ALARM ONLY.
62	23-TSH-919	STEAM TO BRA-EVAP-101B (HT EXCH) TEMP HIGH	300 F							X							X	LOCAL AND CON ALARM
63	23-KX-935A/B	BRA-EVAP-101A DEMISTER PAD SPRAY TIMER	NA															AUTOMATICALLY OPEN 23-XV-935 FOR 10 MIN EVERY 10 HOURS
64		BRA-EVAP-101C/101D (CIRC PUMP) NOT RUNNING	NOT RUNNING							X								

NOTE 1. THE DSIC RECOMMENDS THAT THE SYSTEMS CONTRACTOR VERIFY THE LOGIC SHOWN IN THE A&I MATRICES WITH THAT PROVIDED BY THE BRA AND BRA PAS VENDORS. A CURSORY REVIEW OF THE UMCDF LADDER LOGIC BY THE DSIC SHOWED INCONSISTANCIES BETWEEN THE P&IDS AND THE A&I MATRICES.
NOTE 2. BRINE FEED PUMPS WILL BE STOPPED THROUGH HARDWIRED INTERLOCKS IF ANY OF THE FOLLOWING CONDITIONS ARE SATISFIED: 1) 23-LSLLL-004 AND 23-LSLLL-008 ACTIVATED, 2) 23-LSLLL-004 AND 23-ZS-040A (NOT OPEN) ACTIVATED 3) 23-LSLLL-008 AND 23-ZS-038A (NOT OPEN) ACTIVATED, 4) 23-ZS-038A (NOT OPEN) AND 23-ZS-040A (NOT OPEN) ACTIVATED.
NOTE 3. SETPOINT BY CONTRACTOR.

ANNISTON CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX
(SEE NOTE 1 AND FAWB NOTE B-5)
BRA POLLUTION ABATEMENT SYSTEM

LOCATION: PROCESS UTILITY BUILDING AND OUTSIDE
AREA/SYSTEM: 27
P&IDs: AN-2-D-505, AN-27-D-501/1, -501/2, -502
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-207, 208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	03 SHUTDOWN BRA PAS BURNER	04 CLOSE 27-XV-132/131 BRA-SEPA-101 INLET/OUTLET DAMPERS	05 CLOSE 27-XV-133/134 BRA-SEPA-102 INLET/OUTLET DAMPERS	06 CLOSE 27-XV-156/155 BRA-SEPA-103 INLET/OUTLET DAMPERS	07 OPEN 27-XV-130 BRA PAS BAGHOUSE BYPASS VALVE	08 START BRA-PUMP-105	09 PRE-ALARM	10 ALARM	REMARKS
1	27-LSH-094	BRA-SEPA-103 BRA PAS BAGHOUSE 103 LEVEL HIGH	NOTE 2									X		CON ALARM ONLY.
2	27-LSH-095	BRA-SEPA-102 BRA PAS BAGHOUSE 102 LEVEL HIGH	NOTE 2									X		CON ALARM ONLY.
3	27-LSH-096	BRA-SEPA-101 BRA PAS BAGHOUSE 101 LEVEL HIGH	NOTE 2									X		CON ALARM ONLY.
4	27-ZS-130B	BRA PAS BAGHOUSE BYPASS VALVE	NOT CLOSED	X										RCRA AWFCO BRA 16. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
5	27-PDAH-143A/B	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH	7 in wc	X									X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 12, WHICH LISTS ALARM AS PDAHH.
6	27-PDALL-143A/B	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS LOW LOW	1 in wc	X									X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 13. SEE NOTE 3.
7	27-PDAH-144A/B	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH	7 in wc	X									X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 12, WHICH LISTS ALARM AS PDAHH.
8	27-PDALL-144A/B	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS LOW LOW	1 in wc	X									X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 13. SEE NOTE 3.
9	27-PDAH-145A/B	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH	7 in wc	X									X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 12, WHICH LISTS ALARM AS PDAHH.
10	27-PDALL-145A/B	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS LOW LOW	1 in wc	X									X	LOCAL AND CON ALARM. SETPOINT BASED ON RCRA AWFCO BRA 13. SEE NOTE 3.
11	27-ZS-150B	BRA PAS EXHAUST BLOWER INLET DAMPER	CLOSED			X								INPUT TO BRA-PANL-102 (FSSS).
12	27-FSH-151	BRA-STAK-102 BRA PAS STACK FLOW HIGH	NOTE 2									X		LOCAL ALARM ONLY.
13	27-FSL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW	NOTE 2									X		LOCAL ALARM ONLY.
14	27-FSLL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW LOW	NOTE 2			X	X	X	X	X			X	LOCAL ALARM ONLY. RESPONSE ONLY WHEN CONCURRENT WITH 27-PSH-328. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
15	27-ZS-163A	BRA-EVAP-101A EXHAUST TO BRA PAS BYPASS DAMPER	OPEN									X		CON ALARM ONLY.
16	27-ZS-164B	BRA-EVAP-101A EXHAUST DAMPAER TO BRA PAS	CLOSED									X		CON ALARM ONLY.
17	27-TSH-168	BRA PAS BAGHOUSE INLET TEMP HIGH	NOTE 2											INPUT TO BRA-PANL-102 (FSSS)
18	27-BSLL-170	BRA PAS BURNER	LOCKOUT	X										RCRA AWFCO BRA 14. AWFCO VIA 27-XA-204 (VERIFY VS VENDOR CONFIGURATION)
19	27-TAH-172	BRA PAS BAGHOUSE INLET TEMP HIGH	400 F	X		X	X	X	X	X			X	RCRA AWFCO BRA-11. LOCAL ALARM ONLY. SP FROM RCRA PERMIT. VENDOR DATA SHOWS SP AS 280F.
20	27-TAL-172	BRA PAS BAGHOUSE INLET TEMP LOW	NOTE 2									X		LOCAL ALARM ONLY.
21	27-XA-204	BRA PAS BURNER FLAME LOSS	BURNER OFF	X									X	RCRA AWFCO BRA 14. CON ALARM ONLY. VERIFY RESPONSE VS VENDOR CONFIGURATION.
22	27-PSL-300	BRA PAS BURNER FUEL GAS PRESSURE LOW	NOTE 2											INPUT TO BRA-PANL-102 (FSSS)
23	27-PSH-302	BRA PAS BURNER FUEL GAS PRESSURE HIGH	NOTE 2											INPUT TO BRA-PANL-102 (FSSS)
24	27-PSL-306	BRA PAS BURNER COMBUSTION AIR PRESSURE LOW	NOTE 2			X								INPUT TO BRA-PANL-102 (FSSS).
25	27-XA-325	BRA-BLOW-102 BRA PAS EXHAUST BLOWER COMMON TROUBLE	NA										X	CON ALARM ONLY. RESPONSE TO BE DETERMINED.
26	27-PSH-328	BRA PAS BAGHOUSE INLET PRESSURE HIGH	NOTE 2			X	X	X	X	X			X	LOCAL ALARM ONLY. RESPONSE ONLY WHEN CONCURRENT WITH 27-FSLL-151. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
27	27-LSH-401	BRA PAS SUMP LEVEL HIGH	0.25 in. from bottom										X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL (SEE FAWB NOTE B-24).
28	27-LSHH-401	BRA PAS SUMP LEVEL HIGH HIGH	6" from top								X		X	CON ALARM ONLY (SEE FAWB NOTE B-24).

ANNISTON CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX
(SEE NOTE 1 AND FAWB NOTE B-5)
BRA POLLUTION ABATEMENT SYSTEM

LOCATION: PROCESS UTILITY BUILDING AND OUTSIDE
AREA/SYSTEM: 27
P&IDs: AN-2-D-505, AN-27-D-501/1, -501/2, -502
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-207, 208

				BRA RCRA AWFCO	SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	SHUTDOWN BRA PAS BURNER	CLOSE 27-XV-132/131 BRA-SEPA-101 INLET/OUTLET DAMPERS	CLOSE 27-XV-133/134 BRA-SEPA-102 INLET/OUTLET DAMPERS	CLOSE 27-XV-156/155 BRA-SEPA-103 INLET/OUTLET DAMPERS	OPEN 27-XV-130 BRA PAS BAGHOUSE BYPASS VALVE	START BRA-PUMP-105	PRE-ALARM	ALARM	
LN	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	REMARKS
29	BRA-BLOW-102	BRA PAS EXHAUST BLOWER	MOTOR FAILURE			X	X	X	X	X				INPUT TO BRA-PANL-102 (FSSS)
30	MON-ACAM-152	BRA-STAK-102 BRA PAS STACK ACAMS	NOTE 4	X									X	RCRA AWFCO BRA 15. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.

NOTE 1. THE DSIC RECOMMENDS THAT THE SYSTEMS CONTRACTOR VERIFY THE LOGIC SHOWN IN THE A&I MATRICES WITH THAT PROVIDED BY THE BRA AND BRA PAS VENDORS. A CURSORY REVIEW OF THE UMCDF LADDER LOGIC BY THE DSIC SHOWED INCONSISTANCIES BETWEEN THE P&IDS AND THE A&I MATRICES.
NOTE 2. SETPOINT BY CONTRACTOR.
NOTE 3: WHEN LOW-LOW DIFFERENTIAL PRESSURE ON 2/3 BAGHOUSES (PDALL-143B/144B/145B), SHUTDOWN BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
NOTE 4: SETPOINT BASED ON ALLOWABLE STACK CONCENTRATION (ASC) FOR CHEMICAL AGENTS (mg/m3): GB=0.0003, HD=0.03, VX=0.0003.

PINE BLUFF CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX (SEE NOTE 1)

BRINE REDUCTION AREA

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: PB-2-D-501, -502, -503, -504, -507
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	08 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	09 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	10 START BRA-PUMP-103 SUMP PUMP	11 START BRA-PUMP-104 SUMP PUMP	12 CLOSE 23-LV-757B, WATER SOFTENER WASTE WATER	13 PRE-ALARM	14 ALARM	REMARKS
1	23-LSHH-002	BRA-TANK-101 BRINE SURGE TANK HIGH HIGH	18'-3"	X													X	HARDWIRED. LOCAL AND CON ALARM
2	23-LSHH-02/06	BRINE SURGE TANKS 101, 102 BOTH LEVELS HIGH-HIGH	18'3"														X	RCRA AWFCO DFS-22, LIC-19, MPF-18. DICO TO DFS/LIC/MPF TO STOP FEED. NOTE: CODE ALSO HAS STOP FEED IF ONE TANK IS HIGH-HIGH AND THE OTHER IS SELECTED FOR FEED TO BRA.
3	23-LAH-003A	BRA-TANK-101 BRINE SURGE TANK HIGH	17'-9"	X													X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE
4	23-LAL-003A	BRA-TANK-101 BRINE SURGE TANK LOW	3'-6"													X		CON ALARM ONLY.
5	23-LSH-003B	BRA-TANK-101 BRINE SURGE TANK HIGH	17'-9"													X		LOCAL ALARM ONLY.
6	23-LSL-003B	BRA-TANK-101 BRINE SURGE TANK LOW	3'-6"													X		LOCAL ALARM ONLY.
7	23-LSLLL-004	BRA-TANK-101 BRINE SURGE TANK LOW LOW LOW	1'-3"			X			X								X	HARDWIRED. CON ALARM ONLY. SEE NOTE 2.
8	23-LSHH-006	BRA-TANK-102 BRINE SURGE TANK HIGH HIGH	18'-3"				X										X	HARDWIRED. LOCAL AND CON ALARM
9	23-LAH-007A	BRA-TANK-102 BRINE SURGE TANK HIGH	17'-9"				X										X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE
10	23-LAL-007A	BRA-TANK-102 BRINE SURGE TANK LOW	3'-6"													X		CON ALARM ONLY.
11	23-LSH-007B	BRA-TANK-102 BRINE SURGE TANK HIGH	17'-9"													X		LOCAL ALARM ONLY.
12	23-LSL-007B	BRA-TANK-102 BRINE SURGE TANK LOW	3'-6"													X		LOCAL ALARM ONLY.
13	23-LSLLL-008	BRA-TANK-102 BRINE SURGE TANK LOW LOW LOW	1'-3"			X			X								X	HARDWIRED. CON ALARM ONLY. SEE NOTE 2.
14	23-LSH-025	BRINE STORAGE AREA SUMP LEVEL HIGH	0.25 in. from bottom														X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL (SEE FAWB NOTE B-24).
15	23-LSHH-025	BRINE STORAGE AREA SUMP LEVEL HIGH-HIGH	6" from top										X				X	CON ALARM ONLY (SEE FAWB NOTE B-24).
16	23-LSLL-029	BRA-TANK-101 BRINE SURGE TANK LOW LOW	3'-0"		X												X	HARDWIRED. LOCAL ALARM ONLY.
17	23-LSLL-032	BRA-TANK-102 BRINE SURGE TANK LOW LOW	3'-0"					X									X	HARDWIRED. LOCAL ALARM ONLY.
18	23-ZS-038B	BRA-TANK-101 DISCH VALVE CLOSED	CLOSED			X			X									HARDWIRED
19	23-ZS-040B	BRA-TANK-102 DISCH VALVE CLOSED	CLOSED			X			X									HARDWIRED
20	23-FAH-042	BRA-EVAP-101 TO ALL DRUM DRYERS FLOW HIGH	SEE NOTE 3															SEE NOTE 3.
21	23-FAHH-042	BRA-EVAP-101 TO ALL DRUM DRYERS FLOW HIGH HIGH	SEE NOTE 3															SEE NOTES 3 & 4.
22	23-FQAH-042	BRA-EVAP-101 TO ALL DRUM DRYERS FLOW HIGH	SEE REMARKS														X	RCRA AWFCO BRA 10. SP IS 10.6 GPM PER RCRA PERMIT TABLE XIV-6, REVISED 4/16/2001. SP TO BE ADJUSTED PERIODICALLY OR AS NECESSARY TO COMPLY WITH FINAL METALS AND CHLORINE LIMITATIONS. SEE NOTES 3 & 4.
23	23-TISH-110	BRA-EVAP-101 TO DRUM DRYERS TEMP HIGH	250 F														X	CON ALARM ONLY. SETPOINT FROM RCRA AWFCO BRA 9. INSTRUMENT DATA SHEET SETPOINT IS 230 F. SEE NOTE 5.
24	23-TISHH-110	BRA-EVAP-101 TO DRUM DRYERS TEMP HIGH HIGH	SEE NOTE 5														X	SEE NOTES 4 & 5.
25	23-XA-115	SHUTDOWN FROM BRA-PANL-101	SHUTDOWN			X			X	X					X		X	LOCAL ALARM ONLY. ALSO CLOSE 23-XV-935 (PROCESS WATER) AND BRINE FEED PUMP SUCTION VALVES 23-XV-38/40 AND RECIRCULATION VALVES 23-XV-37/39.
26	23-PSH-168	BRA-PUMP-101 SEAL POT AIR SUPPLY PRESS HIGH	NOTE 6													X		LOCAL ALARM ONLY.
27	23-XS-170	BRA-DDYR-101 COMMON TROUBLE	NA														X	CON ALARM ONLY.

PINE BLUFF CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX (SEE NOTE 1)

BRINE REDUCTION AREA

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: PB-2-D-501, -502, -503, -504, -507
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	08 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	09 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	10 START BRA-PUMP-103 SUMP PUMP	11 START BRA-PUMP-104 SUMP PUMP	12 CLOSE 23-LV-757B, WATER SOFTENER WASTE WATER	13 PRE-ALARM	14 ALARM	REMARKS
28	23-PSH-171	BRA-PUMP-102 SEAL POT AIR SUPPLY PRESS HIGH	NOTE 6													X		LOCAL ALARM ONLY.
29	23-LSH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH	0.25 in. from bottom														X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL (SEE FAWB NOTE B-24).
30	23-LSHH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH-HIGH	6" from top											X			X	CON ALARM ONLY (SEE FAWB NOTE B-24).
31	23-XS-175	BRA-DDYR-102 COMMON TROUBLE	NA														X	CON ALARM ONLY.
32	23-LSL-177	BRA-PUMP-101 SEAL POT LEVEL LOW	NOTE 6													X		LOCAL ALARM ONLY.
33	23-LSL-178	BRA-PUMP-102 SEAL POT LEVEL LOW	NOTE 6													X		LOCAL ALARM ONLY.
34	23-PSH-190	BRA-HEAT-110 DRM DRYER AIR HEATER DISCH PRESS HIGH	NOTE 6									X					X	CON ALARM ONLY.
35	23-XA-190	BRA-HEAT-110 DRM DRYER AIR HEATER MALF	MALF													X		CON ALARM ONLY.
36	23-TAH-267	BRA-TANK-101 TEMPERATURE HIGH	NOTE 6													X		CON ALARM ONLY.
37	23-TAL-267	BRA-TANK-101 TEMPERATURE LOW	NOTE 6													X		CON ALARM ONLY.
38	23-TAH-268	BRA-TANK-102 TEMPERATURE HIGH	NOTE 6													X		CON ALARM ONLY.
39	23-TAL-268	BRA-TANK-102 TEMPERATURE LOW	NOTE 6													X		CON ALARM ONLY.
40	23-LSH-757	BRA-EVAP-101A LEVEL HIGH	80%													X		LOCAL AND CON ALARM
41	23-LSHH-757	BRA-EVAP-101A LEVEL HIGH-HIGH	90%			X			X						X		X	LOCAL AND CON ALARM
42	23-LSL-757	BRA-EVAP-101A LEVEL LOW	25%													X		LOCAL AND CON ALARM
43	23-LSLL-757	BRA-EVAP-101A LEVEL LOW-LOW	15%							X							X	LOCAL AND CON ALARM
44	23-LSH-758	BRA-DDYR-101 LEVEL HIGH	NOTE 6													X		LOCAL ALARM ONLY.
45	23-LSHH-758	BRA-DDYR-101 LEVEL HIGH-HIGH	10 in														X	S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR. SETPOINT PER VENDOR DATA.
46	23-LSL-758	BRA-DDYR-101 LEVEL LOW	NOTE 6													X		LOCAL ALARM ONLY.
47	23-LSH-759	BRA-DDYR-102 LEVEL HIGH	NOTE 6													X		LOCAL ALARM ONLY.
48	23-LSHH-759	BRA-DDYR-102 LEVEL HIGH-HIGH	10 in														X	S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR. SETPOINT PER VENDOR DATA.
49	23-LSL-759	BRA-DDYR-102 LEVEL LOW	NOTE 6													X		LOCAL ALARM ONLY.
50	23-PSL-821	BRA-DDYR-101 STEAM SUPPLY PRESSURE LOW	70 psig													X		LOCAL AND CON ALARM. SP BASED ON TOCDF. VENDOR DATA SHOWS 7 PSIG SP. PER DSIC, SP SHOULD BE 70 PSIG. SC TO VERIFY.
51	23-PSL-822	BRA-DDYR-102 STEAM SUPPLY PRESSURE LOW	70 psig													X		LOCAL AND CON ALARM. SP BASED ON TOCDF. VENDOR DATA SHOWS 7 PSIG SP. PER DSIC, SP SHOULD BE 70 PSIG. SC TO VERIFY.
52	23-XS-827	BRA-EVAP-101 LOCAL CONTROL PANEL COMMON TROUBLE	NA													X		CON ALARM ONLY.
53	23-PDISH-828	BRA-PUMP-101 INLET STRAINER DIFF PRESS HIGH	11 psi													X		LOCAL ALARM ONLY. SETPOINT FROM INSTRUMENT DATA SHEET.
54	23-PDISH-829	BRA-PUMP-102 INLET STRAINER DIFF PRESS HIGH	11 psi													X		LOCAL ALARM ONLY. SETPOINT FROM INSTRUMENT DATA SHEET.
55	23-DSH-834	BRA-EVAP-101A RECIRC DENSITY HIGH	1.25 sg														X	LOCAL & CON ALARM. SETPOINT FROM RCRA AWFCO BRA 07 (SEE NOTE 7 & FAWB NOTE B-6).
56	23-DSHH-834	BRA-EVAP-101A RECIRC DENSITY HIGH HIGH	SEE NOTE 7														X	LOCAL AND CON ALARM. SEE NOTES 4 & 7.
57	23-DSL-834	BRA-EVAP-101A RECIRC DENSITY LOW	1.08 sg															ALARM/SETPOINT FROM RCRA AWFCO BRA-8. SEE NOTE 7.
58	23-DSLL-834	BRA-EVAP-101A RECIRC DENSITY LOW LOW	SEE NOTE 7															LOCAL AND CON ALARM. SEE NOTES 4 & 7.

PINE BLUFF CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX (SEE NOTE 1)

BRINE REDUCTION AREA

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: PB-2-D-501, -502, -503, -504, -507
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	08 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	09 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	10 START BRA-PUMP-103 SUMP PUMP	11 START BRA-PUMP-104 SUMP PUMP	12 CLOSE 23-LV-757B, WATER SOFTENER WASTE WATER	13 PRE-ALARM	14 ALARM	REMARKS
59	23-ZS-834	BRA-EVAP-101A STEAM SUPPLY VALVE POSITION	CLOSED								X							
60	23-TISH-836	BRA-EVAP-101A RECIRC TEMP HIGH	NOTE 6													X		CON ALARM ONLY.
61	23-FSH-837	BRA-EVAP-101A FLOW FROM BRA-PUMP-101/102 HIGH	NOTE 6													X		CON ALARM ONLY.
62	23-LSL-840	BRA-EVAP-101C (CIRC PUMP) SEAL POT LEVEL LOW	NOTE 6													X		LOCAL ALARM ONLY.
63	23-PSH-840	BRA-EVAP-101C (CIRC PUMP) SEAL POT PRESS HIGH	35 psig													X		LOCAL ALARM ONLY. SP PER AS-BUILT P&ID 2-EVP-018A-M-002 Rev 2, 1/9/98.
64	23-ISH-843	BRA-EVAP-101C (CIRC PUMP) CURRENT HIGH	NOTE 6													X		LOCAL ALARM ONLY.
65	23-LSL-844	BRA-EVAP-101D (CIRC PUMP) SEAL POT LEVEL LOW	NOTE 6													X		LOCAL ALARM ONLY.
66	23-PSH-844	BRA-EVAP-101D (CIRC PUMP) SEAL POT PRESS HIGH	35 psig													X		LOCAL ALARM ONLY. SP PER AS-BUILT P&ID 2-EVP-018A-M-002 Rev 2, 1/9/98.
67	23-ISH-846	BRA-EVAP-101D (CIRC PUMP) CURRENT HIGH	NOTE 6													X		LOCAL ALARM ONLY.
68	23-TSH-919	STEAM TO BRA-EVAP-101B (HT EXCH) TEMP HIGH	300 F							X							X	LOCAL AND CON ALARM
69	23-KX-935A/B	BRA-EVAP-101A DEMISTER PAD SPRAY TIMER	NA															AUTOMATICALLY OPEN 23-XV-935 FOR 10 MIN EVERY 10 HOURS
70		2 BRA TANKS @ HI HI OR NOT SELECTED																RCRA AWFCO DFS-22, LIC-19, MPF-18. DICO TO DFS, LIC & MPF TO STOP FEED
71		BRA-EVAP-101C/101D (CIRC PUMP) NOT RUNNING	NOT RUNNING							X								

NOTE 1. THE DSIC RECOMMENDS THAT THE SYSTEMS CONTRACTOR VERIFY THE LOGIC SHOWN IN THE A&I MATRICES WITH THAT PROVIDED BY THE BRA AND BRA PAS VENDORS. A CURSORY REVIEW OF THE UMCDF LADDER LOGIC BY THE DSIC SHOWED INCONSISTANCIES BETWEEN THE P&IDS AND THE A&I MATRICES.
NOTE 2. BRINE FEED PUMPS WILL BE STOPPED THROUGH HARDWIRED INTERLOCKS IF ANY OF THE FOLLOWING CONDITIONS ARE SATISFIED: 1) 23-LSLLL-004 AND 23-LSLLL-008 ACTIVATED, 2) 23-LSLLL-004 AND 23-ZS-040A (NOT OPEN) ACTIVATED 3) 23-LSLLL-008 AND 23-ZS-038A (NOT OPEN) ACTIVATED, 4) 23-ZS-038A (NOT OPEN) AND 23-ZS-040A (NOT OPEN) ACTIVATED.
NOTE 3. THE DESIGN AND RCRA PERMIT CURRENTLY HAVE 23-FQAH-042 AS RCRA AWFCO BRA-10. APPROVED ECP PBAP1323BRA DELETES THIS ALARM AND REPLACES IT WITH A PREALARM, 23-FAH-042, AT 11 GPM, AND 23-FAHH-042 AS THE RCRA AWFCO AT 12 GPM ON A ROLLING HOURLY BASIS. AN ENGINEERING STOP FEED IS ALSO BEING ADDED BASED ON AN INSTANTANEOUS FLOW RATE OF 12 GPM (TAG # TO BE DETERMINED). IF THESE RCRA PERMIT CHANGES ARE APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED AWFCO.
NOTE 4. ECP PBAP1323BRA PROPOSES TO DEFINE "BRA RCRA AWFCO" AS CLOSURE OF THE DRUM DRYER FEED VALVES 23-LV-758A, -759A. IF THIS RCRA PERMIT CHANGE IS APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED AWFCO RESPONSE.
NOTE 5. THE RCRA PERMIT CURRENTLY HAS 23-TAH-110 AS RCRA AWFCO BRA-9. APPROVED ECP PBAP1323BRA ADDS 23-TISHH-110 AS BRA-9 (SP=250F). 23-TISH-110 BECOMES A PREALARM (SP=240F). IF THIS RCRA PERMIT CHANGE IS APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED AWFCO.
NOTE 6. SETPOINT BY CONTRACTOR.
NOTE 7. THE RCRA PERMIT CURRENTLY HAS 23-DAH-834 AND 23-DIT[DAL]-834 AS RCRA AWFCOS BRA-7 AND BRA-8. APPROVED ECP PBAP1323BRA ADDS 23-DSHH-834 AS BRA-7 (SP=1.25 SG), 23-DSLL-834 AS BRA-8 (SP=1.05 SG), AND 23-DSL-834 AS A PREALARM (SP=1.06 SG). 23-DSH-834 WOULD BECOME A PREALARM (SP=1.20 SG). IF THESE RCRA PERMIT CHANGES ARE APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED AWFCOS.

PINE BLUFF CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX (SEE NOTE 1)

BRA POLLUTION ABATEMENT SYSTEM

LOCATION: PROCESS UTILITY BUILDING AND OUTSIDE
AREA/SYSTEM: 27
P&IDs: PB-2-D-505, PB-27-D-501, -502, -503
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-207, 208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	03 SHUTDOWN BRA PAS BURNER	04 CLOSE 27-XV-132/131 BRA-SEPA-101 INLET/OUTLET DAMPERS	05 CLOSE 27-XV-133/134 BRA-SEPA-102 INLET/OUTLET DAMPERS	06 CLOSE 27-XV-156/155 BRA-SEPA-103 INLET/OUTLET DAMPERS	07 OPEN 27-XV-130 BRA PAS BAGHOUSE BYPASS VALVE	08 START BRA-PUMP-105	09 PRE-ALARM	10 ALARM	REMARKS
1	27-LSH-094	BRA-SEPA-103 BRA PAS BAGHOUSE 103 LEVEL HIGH	NOTE 2									X		CON ALARM ONLY.
2	27-LSH-095	BRA-SEPA-102 BRA PAS BAGHOUSE 102 LEVEL HIGH	NOTE 2									X		CON ALARM ONLY.
3	27-LSH-096	BRA-SEPA-101 BRA PAS BAGHOUSE 101 LEVEL HIGH	NOTE 2									X		CON ALARM ONLY.
4	27-ZS-130B	BRA PAS BAGHOUSE BYPASS VALVE	NOT CLOSED	X										RCRA AWFCO BRA 16. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
5	27-PDAH-143A/B	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH	7 in wc	X									X	LOCAL AND CON ALARM. SETPOINT FROM RCRA AWFCO BRA-12. SEE NOTE 3.
6	27-PDAHH-143A/B	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH HIGH	SEE NOTE 3		X	X	X	X	X				X	SEE NOTES 3 & 4.
7	27-PDAL-143A/B	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS LOW	0.3 in wc									X		ALARM BEING ADDED BY PBAP1323BRA.
8	27-PDALL-143A/B	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS LOW LOW	1 in wc	X									X	LOCAL AND CON ALARM. SETPOINT FROM RCRA AWFCO BRA-13. SEE NOTES 4, 5, & 6.
9	27-PDAH-144A/B	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH	7 in wc	X									X	LOCAL AND CON ALARM. SETPOINT FROM RCRA AWFCO BRA-12. SEE NOTE 3.
10	27-PDAHH-144A/B	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH HIGH	SEE NOTE 3		X	X	X	X	X				X	SEE NOTES 3 & 4.
11	27-PDAL-144A/B	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS LOW	0.3 in wc									X		ALARM BEING ADDED BY PBAP1323BRA.
12	27-PDALL-144A/B	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS LOW LOW	1 in wc	X									X	LOCAL AND CON ALARM. SETPOINT FROM RCRA AWFCO BRA-13. SEE NOTES 4, 5, & 6.
13	27-PDAH-145A/B	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH	7 in wc	X									X	LOCAL AND CON ALARM. SETPOINT FROM RCRA AWFCO BRA-12. SEE NOTE 3.
14	27-PDAHH-145A/B	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH HIGH	SEE NOTE 3		X	X	X	X	X				X	SEE NOTES 3 & 4.
15	27-PDAL-145A/B	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS LOW	0.3 in wc									X		ALARM BEING ADDED BY PBAP1323BRA.
16	27-PDALL-145A/B	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS LOW LOW	1 in wc	X									X	LOCAL AND CON ALARM. SETPOINT FROM RCRA AWFCO BRA-13. SEE NOTES 4, 5, & 6.
17	27-ZS-150B	BRA PAS EXHAUST BLOWER INLET DAMPER	CLOSED			X								INPUT TO BRA-PANL-102 (FSSS).
18	27-FSH-151	BRA-STAK-102 BRA PAS STACK FLOW HIGH	NOTE 2									X		LOCAL ALARM ONLY.
19	27-FSL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW	NOTE 2									X		LOCAL ALARM ONLY.
20	27-FSLL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW LOW	NOTE 2			X	X	X	X	X			X	LOCAL ALARM ONLY. RESPONSE ONLY WHEN CONCURRENT WITH 27-PSH-328. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
21	27-ZS-163A	BRA-EVAP-101A EXHAUST TO BRA PAS BYPASS DAMPER	OPEN									X		CON ALARM ONLY.
22	27-ZS-164B	BRA-EVAP-101A EXHAUST DAMPAER TO BRA PAS	CLOSED									X		CON ALARM ONLY.
23	27-TSH-168	BRA PAS BAGHOUSE INLET TEMP HIGH	NOTE 2											INPUT TO BRA-PANL-102 (FSSS)
24	27-BSLL-170	BRA PAS BURNER	LOCKOUT	X										RCRA AWFCO BRA 14. SEE NOTE 4.
25	27-TAH-172	BRA PAS BAGHOUSE INLET TEMP HIGH	400°F	X									X	LOCAL ALARM ONLY. SP FROM RCRA AWFCO BRA-11. VENDOR DATA SHOWS SP AS 280F. SEE NOTE 7.
26	27-TAHH-172	BRA PAS BAGHOUSE INLET TEMP HIGH HIGH	SEE NOTE 7										X	SEE NOTES 4 & 7.
27	27-TAHHH-172	BRA PAS BAGHOUSE INLET TEMP HIGH HIGH HIGH	280°F			X	X	X	X	X			X	ALARM BEING ADDED TO DESIGN BY PBAP1323BRA. SEE NOTE 7.
28	27-TAL-172	BRA PAS BAGHOUSE INLET TEMP LOW	NOTE 2									X		LOCAL ALARM ONLY.
29	27-XA-204	BRA PAS BURNER FLAME LOSS	BURNER OFF	X									X	RCRA AWFCO BRA 14. CON ALARM ONLY. VERIFY RESPONSE VS VENDOR CONFIGURATION.
30	27-PSL-300	BRA PAS BURNER FUEL GAS PRESSURE LOW	NOTE 2											INPUT TO BRA-PANL-102 (FSSS)
31	27-PSH-302	BRA PAS BURNER FUEL GAS PRESSURE HIGH	NOTE 2											INPUT TO BRA-PANL-102 (FSSS)

PINE BLUFF CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX (SEE NOTE 1)

BRA POLLUTION ABATEMENT SYSTEM

LOCATION: PROCESS UTILITY BUILDING AND OUTSIDE
AREA/SYSTEM: 27
P&IDs: PB-2-D-505, PB-27-D-501, -502, -503
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-207, 208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	03 SHUTDOWN BRA PAS BURNER	04 CLOSE 27-XV-132/131 BRA-SEPA-101 INLET/OUTLET DAMPERS	05 CLOSE 27-XV-133/134 BRA-SEPA-102 INLET/OUTLET DAMPERS	06 CLOSE 27-XV-156/155 BRA-SEPA-103 INLET/OUTLET DAMPERS	07 OPEN 27-XV-130 BRA PAS BAGHOUSE BYPASS VALVE	08 START BRA-PUMP-105	09 PRE-ALARM	10 ALARM	REMARKS
32	27-PSL-306	BRA PAS BURNER COMBUSTION AIR PRESSURE LOW	NOTE 2			X								INPUT TO BRA-PANL-102 (FSSS).
33	27-XA-325	BRA-BLOW-102 BRA PAS EXHAUST BLOWER COMMON TROUBLE	NA										X	CON ALARM ONLY. RESPONSE TO BE DETERMINED.
34	27-PSH-328	BRA PAS BAGHOUSE INLET PRESSURE HIGH	NOTE 2			X	X	X	X	X			X	LOCAL ALARM ONLY. RESPONSE ONLY WHEN CONCURRENT WITH 27-FSLL-151. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
35	27-LSH-401	BRA PAS SUMP LEVEL HIGH	0.25 in. from bottom										X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL (SEE FAWB NOTE B-24).
36	27-LSHH-401	BRA PAS SUMP LEVEL HIGH HIGH	6" from top								X		X	CON ALARM ONLY (SEE FAWB NOTE B-24).
37	BRA-BLOW-102	BRA PAS EXHAUST BLOWER	MOTOR FAILURE			X	X	X	X	X				INPUT TO BRA-PANL-102 (FSSS)
38	MON-ACAM-152	BRA-STAK-102 BRA PAS STACK ACAMS	NOTE 8	X									X	RCRA AWFCO BRA 15. S/D BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.

NOTE 1. THE DSIC RECOMMENDS THAT THE SYSTEMS CONTRACTOR VERIFY THE LOGIC SHOWN IN THE A&I MATRICES WITH THAT PROVIDED BY THE BRA AND BRA PAS VENDORS. A CURSORY REVIEW OF THE UMCDF LADDER LOGIC BY THE DSIC SHOWED INCONSISTANCIES BETWEEN THE P&IDS AND THE A&I MATRICES.
NOTE 2. SETPOINT BY CONTRACTOR.
NOTE 3. THE RCRA PERMIT CURRENTLY HAS 27-PDAH-143B/144B/145B AS RCRA AWFCO BRA-12. APPROVED ECP PBAP1323BRA ADDS 27-PDAHH-143A/B,-144A/B,-145A/B AS BRA-12 (SP=7 IN. 27-PDAH-143A/B,-144A/B,-145A/B BECOME PREALARMS (SP=5.5 IN. WC.). IF THIS RCRA PERMIT CHANGE IS APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED
NOTE 4. ECP PBAP1323BRA PROPOSES TO DEFINE "BRA RCRA AWFCO" AS CLOSURE OF THE DRUM DRYER FEED VALVES 23-LV-758A, -759A. IF THIS RCRA PERMIT CHANGE IS APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED AWFCO RESPONSE.
NOTE 5. WHEN LOW-LOW DIFFERENTIAL PRESSURE ON 2/3 BAGHOUSES (PDALL-143B/144B/145B), SHUTDOWN BRA PAS BAGHOUSES, DRUM DRYERS, AND EVAPORATOR.
NOTE 6. THE RCRA PERMIT CURRENTLY HAS 27-PDALL-143B/144B/145B AS RCRA AWFCO BRA-13 WITH A SETPOINT OF 1 IN. WC.. APPROVED ECP PBAP1323BRA MODIFIES THE SETPOINT TO BE AND ADDS 27-PDAL-143A/B,-144A/B,-145A/B AS PREALARMS (SP=0.5 IN. WC.). IF THIS RCRA PERMIT CHANGE IS APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPI
NOTE 7. THE RCRA PERMIT CURRENTLY HAS 27-TAH-172 AS RCRA AWFCO BRA-11. APPROVED ECP PBAP1323BRA ADDS 27-TAHH-172 AS BRA-11 (SP=275F) AND 27-TAHHH-172 (SP=275F) FOR BAGHOUSE SHUTDOWN. 27-TAH-172 BECOMES A PREALARM (SP=270F). IF THIS RCRA PERMIT CHANGE IS APPROVED, THE MATRIX WILL BE REVISED TO REFLECT THE APPROVED AWFCO
NOTE 8. SETPOINT BASED ON ALLOWABLE STACK CONCENTRATION (ASC) FOR CHEMICAL AGENTS (mg/m3): GB=0.0003, HD=0.03, VX=0.0003.

TOOELE CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: TE-2-D-501, -502, -503, -504, -505
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201, -208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-HEAT-101B STEAM SUPPLY	08 DE-ENERGIZE 23-XV-61, DESUPERHEATER SUPPLY	09 CLOSE 23-LV-757B BRA-EVAP-101 WASTE WATER VALVE	10 STOP BRA-PUMP-101C/D BRINE CIRCULATION PUMP	11 STOP WTS-PUMP-106 REGEN WASTE TRANSFER PUMP	12 CLOSE 23-LV-758A/B BRA-DDYR-101 BRINE & WASTE WATER VLVS	13 CLOSE 23-LV-759A/B BRA-DDYR-102 BRINE & WASTE WATER VLVS	14 START BRA-PUMP-103 SUMP PUMP	15 START BRA-PUMP-104 SUMP PUMP	16 PRE-ALARM	17 ALARM	REMARKS
1	23-LSHH-002	BRA-TANK-101 BRINE SURGE TANK HIGH HIGH	18'-3"	X																	X	HARDWIRED. LOCAL AND CON ALARM
2	23-LAH-003A	BRA-TANK-101 BRINE SURGE TANK HIGH	14'-2"	X																	X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. SP PER SEPT 2001 PLC CODE.
3	23-LAL-003A	BRA-TANK-101 BRINE SURGE TANK LOW	3'-6"																	X		CON ALARM ONLY. SP PER SEPT 2001 PLC CODE.
4	23-LSH-003B	BRA-TANK-101 BRINE SURGE TANK HIGH	16'-8.3"																	X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
5	23-LSL-003B	BRA-TANK-101 BRINE SURGE TANK LOW	3'-5.4"																	X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
6	23-LSLLL-004	BRA-TANK-101 BRINE SURGE TANK LOW LOW LOW	1'-3"			X			X												X	HARDWIRED. CON ALARM ONLY.
7	23-LSHH-006	BRA-TANK-102 BRINE SURGE TANK HIGH HIGH	18'-3"				X														X	HARDWIRED. LOCAL AND CON ALARM
8	23-LAH-007A	BRA-TANK-102 BRINE SURGE TANK HIGH	14'-2"				X														X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. SP PER SEPT 2001 PLC CODE.
9	23-LAL-007A	BRA-TANK-102 BRINE SURGE TANK LOW	3'-6"																	X		CON ALARM ONLY. SP PER SEPT 2001 PLC CODE.
10	23-LSH-007B	BRA-TANK-102 BRINE SURGE TANK HIGH	16'-8.3"																	X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
11	23-LSL-007B	BRA-TANK-102 BRINE SURGE TANK LOW	3'-5.4"																	X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
12	23-LSLLL-008	BRA-TANK-102 BRINE SURGE TANK LOW LOW LOW	1'-3"			X			X												X	HARDWIRED. CON ALARM ONLY.
13	23-LSL-014	BRA-TANK-9101A, BRA-PUMP-101 PUMP SEAL FLUID LOW	NOTE 1																		X	LOCAL ALARM ONLY.
14	23-LSL-020	BRA-TANK-9102A, BRA-PUMP-102 PUMP SEAL FLUID LOW	NOTE 1																		X	LOCAL ALARM ONLY.
15	23-LSH-025	BRINE STORAGE AREA SUMP LEVEL HIGH	0.25 in.																		X	CON ALARM ONLY. SETPOINT BASED ON FOLLOW-ON SITE INSTRUMENT DATA SHEET.
16	23-LSHH-025	BRINE STORAGE AREA SUMP LEVEL HIGH-HIGH	6" from top																		X	CON ALARM ONLY.
17	23-LSLL-029	BRA-TANK-101 BRINE SURGE TANK LOW LOW	3'-0"		X																X	HARDWIRED. LOCAL ALARM ONLY.
18	23-LSLL-032	BRA-TANK-102 BRINE SURGE TANK LOW LOW	3'-0"					X													X	HARDWIRED. LOCAL ALARM ONLY.
19	23-ZS-038B	BRA-TANK-101 DISCH VALVE CLOSED	CLOSED			X			X													HARDWIRED
20	23-ZS-040B	BRA-TANK-102 DISCH VALVE CLOSED	CLOSED			X			X													HARDWIRED
21	23-XS-170	BRA-DDYR-101 COMMON TROUBLE	NA																		X	CON ALARM ONLY.
22	23-LSH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH	0.25 in.																		X	CON ALARM ONLY. S/D SUMP PUMP IF RUNNING. SETPOINT BASED ON FOLLOW-ON SITE INSTRUMENT DATA SHEET.
23	23-LSHH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH-HIGH	6" from top																X		X	CON ALARM ONLY.
24	23-XS-175	BRA-DDYR-102 COMMON TROUBLE	NA																		X	CON ALARM ONLY.
25	23-LSH-757	BRA-EVAP-101A LEVEL HIGH	76.9 in wc																	X		LOCAL AND CON ALARM
26	23-LSHH-757	BRA-EVAP-101A LEVEL HIGH-HIGH	83 in wc			X			X			X									X	LOCAL AND CON ALARM.
27	23-LSL-757	BRA-EVAP-101A LEVEL LOW	41 in wc																	X		LOCAL AND CON ALARM
28	23-LSLL-757	BRA-EVAP-101A LEVEL LOW-LOW	5 in wc							X			X								X	LOCAL AND CON ALARM.
29	23-ZS-757B	BRA-EVAP-101 WASTE WATER SUPPLY VALVE CLOSED	CLOSED											X								
30	23-LSH-758	BRA-DDYR-101 LEVEL HIGH	NOTE 1																	X		LOCAL ALARM ONLY.
31	23-LSHH-758	BRA-DDYR-101 LEVEL HIGH-HIGH	10 in wc												X						X	LOCAL ALARM ONLY. ALSO, PER ECP TEMP-1704-BRA, ISOLATE BRINE AND STEAM TO BRA EVAPORATORS (SEE FAWB NOTE B-29).
32	23-LSL-758	BRA-DDYR-101 LEVEL LOW	NOTE 1																		X	LOCAL ALARM ONLY.
33	23-ZS-758B	BRA-DDYR-101 WASTE WATER SUPPLY VALVE CLOSED	CLOSED											X								

TOOELE CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: TE-2-D-501, -502, -503, -504, -505
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201, -208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	02 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	03 STOP BRA-PUMP-101, BRINE FEED PUMP	04 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	05 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	06 STOP BRA-PUMP-102, BRINE FEED PUMP	07 CLOSE 23-FV-834, BRA-HEAT-101B STEAM SUPPLY	08 DE-ENERGIZE 23-XV-61, DESUPERHEATER SUPPLY	09 CLOSE 23-LV-757B BRA-EVAP-101 WASTE WATER VALVE	10 STOP BRA-PUMP-101C/D BRINE CIRCULATION PUMP	11 STOP WTS-PUMP-106 REGEN WASTE TRANSFER PUMP	12 CLOSE 23-LV-758A/B BRA-DDYR-101 BRINE & WASTE WATER VLVS	13 CLOSE 23-LV-759A/B BRA-DDYR-102 BRINE & WASTE WATER VLVS	14 START BRA-PUMP-103 SUMP PUMP	15 START BRA-PUMP-104 SUMP PUMP	16 PRE-ALARM	17 ALARM	REMARKS
34	23-LSH-759	BRA-DDYR-102 LEVEL HIGH	NOTE 1																	X		LOCAL ALARM ONLY.
35	23-LSHH-759	BRA-DDYR-102 LEVEL HIGH-HIGH	10 in wc												X						X	LOCAL ALARM ONLY. ALSO, PER ECP TEMP-1704-BRA, ISOLATE BRINE AND STEAM TO BRA EVAPORATORS (SEE FAWB NOTE B-29).
36	23-LSL-759	BRA-DDYR-102 LEVEL LOW	NOTE 1																		X	LOCAL ALARM ONLY.
37	23-ZS-759B	BRA-DDYR-102 WASTE WATER SUPPLY VALVE CLOSED	CLOSED										X									
38	23-PSL-821	BRA-DDYR-101 STEAM SUPPLY PRESSURE LOW	70 psig																		X	LOCAL AND CON ALARM.
39	23-PSL-822	BRA-DDYR-102 STEAM SUPPLY PRESSURE LOW	70 psig																		X	LOCAL AND CON ALARM.
40	23-XA-827	BRA-EVAP-101 LOCAL CONTROL PANEL COMMON TROUBLE	NA																		X	CON ALARM ONLY.
41	23-FSHH-831	BRA-PUMP-101C/D TO DRUM DRYERS, BRA-TANKS-101/102, AND BRA-EVAP-201	NOTE 1																		X	LOCAL ALARM ONLY. ISOLATE FLOW TO ALL DRUM DRYERS (SEE ECP TEMP-1704-BRA & FAWB NOTE B-29; SPECIFIC EQUIPMENT RESPONSES ARE NOT IDENTIFIED).
42	23-DSH-834	BRA-EVAP-101A RECIRC DENSITY HIGH	1.25 sg																		X	LOCAL ALARM ONLY (SEE FAWB NOTE B-6).
43	23-ZS-834	BRA-EVAP-101A STEAM SUPPLY VALVE POSITION	CLOSED								X											
44	23-FSHH-837	BRA-EVAP-101A FLOW FROM BRA-PUMP-101/102 HIGH	29.75 gpm																		X	LOCAL ALARM ONLY. ISOLATE FLOW TO BRA-EVAP-101A (SEE ECP TEMP-1704-BRA & FAWB NOTE B-29; SPECIFIC EQUIPMENT RESPONSES ARE NOT IDENTIFIED).
45	23-LSL-840	BRA-TANK-9101, BRA-PUMP-101C/D PUMP SEAL FLUID LOW	NOTE 1																		X	LOCAL ALARM ONLY.
46	23-ISH-843	BRA-PUMP-101C (CIRC PUMP) CURRENT HIGH	NOTE 1																		X	LOCAL ALARM ONLY.
47	23-ISH-846	BRA-PUMP-101D (CIRC PUMP) CURRENT HIGH	NOTE 1																		X	LOCAL ALARM ONLY.
48	23-TSH-919	STEAM TO BRA-EVAP-101B (HT EXCH) TEMP HIGH	300 F						X												X	LOCAL ALARM ONLY
49	23-KX-935A/B	BRA-EVAP-101A DEMISTER PAD SPRAY TIMER	NA																			AUTOMATICALLY OPEN 23-XV-935 FOR 10 MIN EVERY 10 HOURS
50		4 BRA TANKS @ HI HI OR NOT SELECTED																				RCRA AWFCO DFS-22, LIC-19, MPF-18. DICO TO DFS, LIC & MPF TO STOP FEED
51		BRA-PUMP-101C/101D (CIRC PUMP) NOT RUNNING	NOT RUNNING						X													

NOTE 1: SETPOINT COULD NOT BE DETERMINED FROM AVAILABLE DOCUMENTATION

TOOELE CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 2

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-511, -512, -513
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-202, -208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-701, BRA-TANK-201 INLET VALVE	02 STOP BRA-AGIT-201, BRA-TANK-201 AGITATOR	03 STOP BRA-PUMP-201, BRINE FEED PUMP	04 CLOSE 23-LV-705, BRA-TANK-202 INLET VALVE	05 STOP BRA-AGIT-202, BRA-TANK-202 AGITATOR	06 STOP BRA-PUMP-202, BRINE FEED PUMP	07 CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY	08 DE-ENERGIZE 23-XV-65, DESUPERHEATER SUPPLY	09 CLOSE 23-LV-720B BRA-EVAP-201 WASTE WATER VALVE	10 STOP BRA-PUMP-201C/D BRINE CIRCULATION PUMP	11 STOP WTS-PUMP-106 REGEN WASTE TRANSFER PUMP	12 CLOSE 23-LV-760A/B BRA-DDYR-201 BRINE & WASTE WATER VLVS	13 START BRA-PUMP-204 SUMP PUMP	14 PRE-ALARM	15 ALARM	REMARKS
1	23-LSHH-702	BRA-TANK-201 BRINE SURGE TANK HIGH HIGH	18'-3"	X															X	HARDWIRED. LOCAL AND CON ALARM
2	23-LAH-703A	BRA-TANK-201 BRINE SURGE TANK HIGH	14'-2"	X															X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. SP PER SEPT 2001 PLC CODE.
3	23-LAL-703A	BRA-TANK-201 BRINE SURGE TANK LOW	3'-6"															X		CON ALARM ONLY. SP PER SEPT 2001 PLC CODE.
4	23-LSH-703B	BRA-TANK-201 BRINE SURGE TANK HIGH	16'-8.3"															X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
5	23-LSL-703B	BRA-TANK-201 BRINE SURGE TANK LOW	3'-5.4"															X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
6	23-LSLLL-704	BRA-TANK-201 BRINE SURGE TANK LOW LOW LOW	1'-3"			X			X										X	HARDWIRED. CON ALARM ONLY.
7	23-LSHH-706	BRA-TANK-202 BRINE SURGE TANK HIGH HIGH	18'-3"				X												X	HARDWIRED. LOCAL AND CON ALARM
8	23-LAH-707A	BRA-TANK-202 BRINE SURGE TANK HIGH	14'-2"				X												X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. SP PER SEPT 2001 PLC CODE.
9	23-LAL-707A	BRA-TANK-202 BRINE SURGE TANK LOW	3'-6"															X		CON ALARM ONLY. SP PER SEPT 2001 PLC CODE.
10	23-LSH-707B	BRA-TANK-202 BRINE SURGE TANK HIGH	16'-8.3"															X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
11	23-LSL-707B	BRA-TANK-202 BRINE SURGE TANK LOW	3'-5.4"															X		LOCAL ALARM ONLY. SETPOINT BASED ON 0-221" RANGE
12	23-LSLLL-708	BRA-TANK-202 BRINE SURGE TANK LOW LOW LOW	1'-3"			X			X										X	HARDWIRED. CON ALARM ONLY.
13	23-LSL-714	BRA-TANK-9201A, BRA-PUMP-201 PUMP SEAL FLUID LOW	NOTE 1																X	LOCAL ALARM ONLY.
14	23-LSH-720	BRA-EVAP-201A LEVEL HIGH	76.9 in wc															X		LOCAL AND CON ALARM
15	23-LSHH-720	BRA-EVAP-201A LEVEL HIGH-HIGH	83 in wc			X			X			X							X	LOCAL AND CON ALARM.
16	23-LSL-720	BRA-EVAP-201A LEVEL LOW	41 in wc															X		LOCAL AND CON ALARM
17	23-LSL-720	BRA-TANK-9202A, BRA-PUMP-202 PUMP SEAL FLUID LOW	NOTE 1																X	LOCAL ALARM ONLY.
18	23-LSLL-720	BRA-EVAP-201A LEVEL LOW-LOW	5 in wc							X			X						X	LOCAL AND CON ALARM.
19	23-ZS-720B	BRA-EVAP-201 WASTE WATER SUPPLY VALVE CLOSED	CLOSED											X						
20	23-TSH-724	STEAM TO BRA-EVAP-201B (HT EXCH) TEMP HIGH	300 F							X									X	LOCAL ALARM ONLY
21	23-KX-725A/B	BRA-EVAP-201A DEMISTER PAD SPRAY TIMER	NA																	AUTOMATICALLY OPEN 23-XV-935 FOR 10 MIN EVERY 10 HOURS
22	23-LSLL-729	BRA-TANK-201 BRINE SURGE TANK LOW LOW	3'-0"		X														X	HARDWIRED. LOCAL ALARM ONLY.
23	23-LSLL-732	BRA-TANK-202 BRINE SURGE TANK LOW LOW	3'-0"				X												X	HARDWIRED. LOCAL ALARM ONLY.
24	23-ISH-734	BRA-PUMP-201D (CIRC PUMP) CURRENT HIGH	NOTE 1																X	LOCAL ALARM ONLY.
25	23-ISH-735	BRA-PUMP-201C (CIRC PUMP) CURRENT HIGH	NOTE 1																X	LOCAL ALARM ONLY.
26	23-ZS-738B	BRA-TANK-201 DISCH VALVE CLOSED	CLOSED			X			X											HARDWIRED
27	23-ZS-740B	BRA-TANK-202 DISCH VALVE CLOSED	CLOSED			X			X											HARDWIRED
28	23-LSH-754	BRA-EVAP-201 AREA SUMP LEVEL HIGH	0.25 in.															X		CON ALARM ONLY. SETPOINT BASED ON FOLLOW-ON SITE INSTRUMENT DATA SHEET.
29	23-LSHH-754	BRA-EVAP-201 AREA SUMP LEVEL HIGH-HIGH	6" from top														X		X	CON ALARM ONLY.
30	23-XS-756	BRA-DDYR-201 COMMON TROUBLE	NA																X	CON ALARM ONLY.
31	23-LSH-760	BRA-DDYR-201 LEVEL HIGH	NOTE 1															X		LOCAL ALARM ONLY.

TOOELE CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 2

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-511, -512, -513
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-202, -208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 CLOSE 23-LV-701, BRA-TANK-201 INLET VALVE	02 STOP BRA-AGIT-201, BRA-TANK-201 AGITATOR	03 STOP BRA-PUMP-201, BRINE FEED PUMP	04 CLOSE 23-LV-705, BRA-TANK-202 INLET VALVE	05 STOP BRA-AGIT-202, BRA-TANK-202 AGITATOR	06 STOP BRA-PUMP-202, BRINE FEED PUMP	07 CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY	08 DE-ENERGIZE 23-XV-65, DESUPERHEATER SUPPLY	09 CLOSE 23-LV-720B BRA-EVAP-201 WASTE WATER VALVE	10 STOP BRA-PUMP-201C/D BRINE CIRCULATION PUMP	11 STOP WTS-PUMP-106 REGEN WASTE TRANSFER PUMP	12 CLOSE 23-LV-760A/B BRA-DDYR-201 BRINE & WASTE WATER VLVS	13 START BRA-PUMP-204 SUMP PUMP	14 PRE-ALARM	15 ALARM	REMARKS
32	23-LSHH-760	BRA-DDYR-201 LEVEL HIGH-HIGH	10 in wc												X				X	LOCAL ALARM ONLY. ALSO, PER ECP TEMP-1704-BRA, ISOLATE BRINE AND STEAM TO BRA EVAPORATORS (SEE FAWB NOTE B-29).
33	23-LSL-760	BRA-DDYR-201 LEVEL LOW	NOTE 1																X	LOCAL ALARM ONLY.
34	23-ZS-760B	BRA-DDYR-201 WASTE WATER SUPPLY VALVE CLOSED	CLOSED											X						
35	23-PSL-823	BRA-DDYR-201 STEAM SUPPLY PRESSURE LOW	70 psig																X	LOCAL AND CON ALARM.
36	23-XA-826	BRA-EVAP-201 LOCAL CONTROL PANEL COMMON TROUBLE	NA																X	CON ALARM ONLY.
37	23-FSHH-835	BRA-EVAP-201A FLOW FROM BRA-PUMP-201/202 HIGH	29.75 gpm																X	LOCAL ALARM ONLY. ISOLATE FLOW TO BRA-EVAP-201A (SEE ECP TEMP-1704-BRA & FAWB NOTE B-29; SPECIFIC EQUIPMENT RESPONSES ARE NOT IDENTIFIED).
38	23-DSH-887	BRA-EVAP-201A RECIRC DENSITY HIGH	1.25 sg																X	LOCAL ALARM ONLY (SEE FAWB NOTE B-6).
39	23-ZS-887	BRA-EVAP-201A STEAM SUPPLY VALVE POSITION	CLOSED								X									
40	23-FSHH-889	BRA-PUMP-201C/D TO DRUM DRYERS, BRA-TANKS-201/202, AND BRA-EVAP-101	NOTE 1																X	LOCAL ALARM ONLY. ISOLATE FLOW TO ALL DRUM DRYERS (SEE ECP TEMP-1704-BRA & FAWB NOTE B-29; SPECIFIC EQUIPMENT RESPONSES ARE NOT IDENTIFIED).
41	23-LSL-891	BRA-TANK-9201, BRA-PUMP-201C/D PUMP SEAL FLUID LOW	NOTE 1																X	LOCAL ALARM ONLY.
42		4 BRA TANKS @ HI HI OR NOT SELECTED																		RCRA AWFCO DFS-22, LIC-19, MPF-18. DICO TO DFS, LIC & MPF TO STOP FEED
43		BRA-EVAP-201C/201D (CIRC PUMP) NOT RUNNING	NOT RUNNING							X										

NOTE 1: SETPOINT COULD NOT BE DETERMINED FROM AVAILABLE DOCUMENTATION

TOOELE CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX

BRA POLLUTION ABATEMENT SYSTEM

LOCATION: PROCESS UTILITY BUILDING AND OUTSIDE
AREA/SYSTEM: 27
P&IDs: TE-2-D-505, TE-27-D-501/1, -501/2, -502
PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-207, -208

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 SHUTDOWN BRA-EVAP-101 BRINE EVAPORATOR PACKAGE	02 SHUTDOWN BRA-EVAP-101 BRINE EVAPORATOR PACKAGE	03 STOP FEED TO BRA-DDYR-101 (CLOSE LV-758A)	04 STOP FEED TO BRA-DDYR-102 (CLOSE LV-759A)	05 STOP FEED TO BRA-DDYR-201 (CLOSE LV-760A)	06 SHUTDOWN BRA-BURN-110 BRA PAS BURNER	07 SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	08 BRA STOP FEED	09 PRE-ALARM	10 ALARM	REMARKS
1	27-TISL-103	BRA-SEPA-101 BRA PAS BAGHOUSE 101 TEMP LOW	250 F										X	LOCAL ALARM ONLY. TURN ON BRA-HEAT-103A-H
2	27-TISLL-103	BRA-SEPA-101 BRA PAS BAGHOUSE 101 TEMP LOW-LOW	225 F										X	LOCAL ALARM ONLY.
3	27-TISL-104	BRA-SEPA-102 BRA PAS BAGHOUSE 102 TEMP LOW	250 F										X	LOCAL ALARM ONLY. TURN ON BRA-HEAT-104A-H
4	27-TISLL-104	BRA-SEPA-102 BRA PAS BAGHOUSE 102 TEMP LOW-LOW	225 F										X	LOCAL ALARM ONLY.
5	27-TISL-105	BRA-SEPA-103 BRA PAS BAGHOUSE 103 TEMP LOW	250 F										X	LOCAL ALARM ONLY. TURN ON BRA-HEAT-105A-H
6	27-TISLL-105	BRA-SEPA-103 BRA PAS BAGHOUSE 103 TEMP LOW-LOW	225 F										X	LOCAL ALARM ONLY.
7	27-TISL-106	BRA-SEPA-104 BRA PAS BAGHOUSE 104 TEMP LOW	250 F										X	LOCAL ALARM ONLY. TURN ON BRA-HEAT-106A-H
8	27-TISLL-106	BRA-SEPA-104 BRA PAS BAGHOUSE 104 TEMP LOW-LOW	225 F										X	LOCAL ALARM ONLY.
9	27-PDISH-143	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH	4 in wc									X		
10	27-PDISHH-143	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH HIGH	7 in wc										X	
11	27-PDSLL-143	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS LOW LOW	1 in wc	X	X	X	X	X	X				X	RCRA. CLOSES BAGHOUSE INLET/OUTLET DAMPERS
12	27-PDISH-144	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH	4 in wc									X		
13	27-PDISHH-144	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH HIGH	7 in wc										X	
14	27-PDSLL-144	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS LOW LOW	0.25 in wc	X	X	X	X	X	X				X	RCRA. CLOSES BAGHOUSE INLET/OUTLET DAMPERS
15	27-PDISH-145	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH	4 in wc									X		
16	27-PDISHH-145	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH HIGH	7 in wc										X	
17	27-PDSLL-145	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS LOW LOW	0.25 in wc										X	RCRA. CLOSES BAGHOUSE INLET/OUTLET DAMPERS
18	27-FSH-151	BRA-STAK-102 BRA PAS STACK FLOW HIGH	NOTE 1										X	NOT LISTED IN LOVELAND DATABASE
19	27-FSL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW	NOTE 1									X		NOT LISTED IN LOVELAND DATABASE
20	27-FSLL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW LOW	NOTE 1										X	NOT LISTED IN LOVELAND DATABASE
21	27-TISH-152A	BRA-BLOW-102 BRA PAS EXHAUST BLOWER MOTOR TEMP HIGH	155 C							X			X	
22	27-TISH-152B	BRA-BLOW-102 BRA PAS EXHAUST BLOWER MOTOR TEMP HIGH	155 C							X			X	
23	27-TISH-152C	BRA-BLOW-102 BRA PAS EXHAUST BLOWER MOTOR TEMP HIGH	155 C							X			X	
24	27-TISH-168	BRA BURNER EXHAUST TEMP HIGH	285 F											FEEDBACK TO BRA PAS BURNER MANAGEMENT PANEL
25	27-BSLL-170	BRA PAS BURNER	LOCKOUT											NOT SHOWN ON P&ID
26	27-TISH-172	BRA PAS BAGHOUSE INLET TEMP HIGH	275 F										X	RCRA.
27	27-TISL-172	BRA PAS BAGHOUSE INLET TEMP LOW	255 F										X	RCRA.
28	27-TSHH-172	BRA PAS BAGHOUSE INLET TEMP HIGH HIGH	275 F	X	X	X	X	X	X				X	RCRA.
29	27-PDISH-186	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS HIGH	4 in wc									X		
30	27-PDISHH-186	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS HIGH HIGH	7 in wc										X	
31	27-PDSLL-186	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS LOW LOW	1 in wc	X	X	X	X	X	X				X	RCRA. CLOSES BAGHOUSE INLET/OUTLET DAMPERS
32	27-TISL-190	BRA-SEPA-105 DRYER KNOCKOUT BOX TEMP LOW	190 F										X	TURN ON BRA-HEAT-102A-H
33	27-TISLL-190	BRA-SEPA-105 DRYER KNOCKOUT BOX TEMP LOW-LOW	90 F										X	
34	27-PSL-300	BRA PAS BURNER FUEL GAS SUPPLY PRESSURE LOW	3 PSIG											SETPOINT PER LOVELAND DATABASE. TE-2-D-505 LISTS SETPOINT OF 1 PSIG
35	27-PSH-302	BRA PAS BURNER FUEL GAS SUPPLY PRESSURE HIGH	5 PSIG											
36	27-PSL-306	BRA-BLOW-101 BRA PAS CA BLOWER DISCH PRESS LOW	3 PSIG											SETPOINT PER LOVELAND DATABASE. TE-2-D-505 LISTS SETPOINT OF 1.5 PSIG
37	27-XA-325	BRA-BLOW-102 BRA PAS EXHAUST BLOWER COMMON TROUBLE	NA										X	ALARM IN CON
38	27-PSHH-328	BRA PAS BAGHOUSE INLET PRESSURE HIGH-HIGH	-1 in wc											

NOTE 1: SETPOINT COULD NOT BE DETERMINED FROM AVAILABLE DOCUMENTATION

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-501, -502, -503, -504, -507

PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	REMARKS	
		BRA RCRA AWFCO																																									
		CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE																																								
		STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR																																								
		STOP BRA-PUMP-101, BRINE FEED PUMP																																								
		CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE																																								
		CLOSE 23-XV-37, BRA-TANK-101 RECYCLE VALVE																																								
		CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE																																								
		STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR																																								
		STOP BRA-PUMP-102, BRINE FEED PUMP																																								
		CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE																																								
		CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE																																								
		STOP BRA-PUMP-201, BRINE FEED PUMP																																								
		CLOSE 23-XV-738, BRA PUMP-201 SUCTION VALVE																																								
		CLOSE 23-XV-737, BRA-TANK-201 RECYCLE VALVE																																								
		STOP BRA-PUMP-202, BRINE FEED PUMP																																								
		CLOSE 23-XV-740, BRA-PUMP-202 SUCTION VALVE																																								
		CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE																																								
		CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY																																								
		DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY																																								
		CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY																																								
		DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY																																								
		CLOSE 23-LV-758A, BRA-DDYR-101 FEED																																								
		CLOSE 23-LV-759A, BRA-DDYR-102 FEED																																								
		CLOSE 23-LV-760A, BRA-DDYR-201 FEED																																								
		STOP BRA-DDYR-101 DRIVE																																								
		STOP BRA-DDYR-101 FEED PENDULUM																																								
		STOP BRA-DDYR-101 SCREW CONVEYOR "A"																																								
		STOP BRA-DDYR-101 SCREW CONVEYOR "B"																																								
		STOP BRA-DDYR-102 DRIVE																																								
		STOP BRA-DDYR-102 FEED PENDULUM																																								
		STOP BRA-DDYR-102 SCREW CONVEYOR "A"																																								
		STOP BRA-DDYR-102 SCREW CONVEYOR "B"																																								
		S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)																																								
		START BRA-PUMP-103 SUMP PUMP																																								
		START BRA-PUMP-104 SUMP PUMP																																								
		PRE-ALARM																																								
		ALARM																																								
1	BRA-PANL-101	BRA PAS SYSTEM SHUTDOWN	NA				X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X														PERFORMED VIA PLC IN BRA-PANL-101	
2	23-ZS-01A	BRA-TANK-101 BRINE SURGE TANK INLET VALVE POSITION	OPEN																																						NOTE 3	
3	23-LSHH-002	BRA-TANK-101 BRINE SURGE TANK HIGH HIGH	18'-3"		X																																		X	HARDWIRED. LOCAL AND CON ALARM.	
4	23-LAH-003A	BRA-TANK-101 BRINE SURGE TANK HIGH	17'-9"		X																																		X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. **ADDRESS=B1:850/00**	CH 1
5	23-LAL-003A	BRA-TANK-101 BRINE SURGE TANK LOW	3'-6"																																			X		CON ALARM ONLY. **ADDRESS=B1:850/02**	CH 1
6	23-LSH-003B	BRA-TANK-101 BRINE SURGE TANK HIGH	17'-9"																																			X		LOCAL ALARM ONLY.	
7	23-LSL-003B	BRA-TANK-101 BRINE SURGE TANK LOW	3'-6"																																			X		LOCAL ALARM ONLY.	
8	23-LSLLL-004	BRA-TANK-101 BRINE SURGE TANK LOW LOW LOW	1'-3"				X					X																											X	HARDWIRED. CON ALARM ONLY. NOTE 2.	
9	23-ZS-05A	BRA-TANK-102 BRINE SURGE TANK INLET VALVE POSITION	OPEN																																						NOTE 3	
10	23-LSHH-006	BRA-TANK-102 BRINE SURGE TANK HIGH HIGH	18'-3"							X																														X	HARDWIRED. LOCAL AND CON ALARM.	
11	23-LAH-007A	BRA-TANK-102 BRINE SURGE TANK HIGH	17'-9"							X																														X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. **ADDRESS=B1:850/04**	CH 1
12	23-LAL-007A	BRA-TANK-102 BRINE SURGE TANK LOW	3'-6"																																			X		CON ALARM ONLY. **ADDRESS=B1:850/06**	CH 1
13	23-LSH-007B	BRA-TANK-102 BRINE SURGE TANK HIGH	17'-9"																																			X		LOCAL ALARM ONLY.	
14	23-LSL-007B	BRA-TANK-102 BRINE SURGE TANK LOW	3'-6"																																			X		LOCAL ALARM ONLY.	
15	23-LSLLL-008	BRA-TANK-102 BRINE SURGE TANK LOW LOW LOW	1'-3"				X					X																											X	HARDWIRED. CON ALARM ONLY. NOTE 2.	
16	23-LSH-025	BRINE STORAGE AREA SUMP LEVEL HIGH	1 in. from bottom																																			X		CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL.	
17	23-LSHH-025	BRINE STORAGE AREA SUMP LEVEL HIGH-HIGH	6" from top																																	X			X	CON ALARM ONLY.	
18	23-LSLL-029	BRA-TANK-101 BRINE SURGE TANK LOW LOW	3'-0"			X																																	X	HARDWIRED. LOCAL ALARM ONLY.	
19	23-LSLL-032	BRA-TANK-102 BRINE SURGE TANK LOW LOW	3'-0"							X																														X	HARDWIRED. LOCAL ALARM ONLY.	
20	23-ZS-038A	BRA-TANK-101 DISCH VALVE POSITION	NOT OPEN									X						X																						NOTE 2.	
21	23-ZS-040A	BRA-TANK-102 DISCH VALVE POSITION	NOT OPEN									X						X																						NOTE 2.	
22	**23-FQAH-042**	**BRA-EVAP-101/201 TO ALL DRUM DRYERS**	**2 GPM**																																					**PERMISSIVE FOR BRA PROCESSING-ENABLES AWFCO SIGNALS.**	CH 1

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-501, -502, -503, -504, -507

PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

BRA RCRA AWFCO
CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE
STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR
STOP BRA-PUMP-101, BRINE FEED PUMP
CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE
CLOSE 23-XV-37, BRA-TANK-101 RECYCLE VALVE
CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE
STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR
STOP BRA-PUMP-102, BRINE FEED PUMP
CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE
CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE
STOP BRA-PUMP-201, BRINE FEED PUMP
CLOSE 23-XV-738, BRA PUMP-201 SUCTION VALVE
CLOSE 23-XV-737, BRA-TANK-201 RECYCLE VALVE
STOP BRA-PUMP-202, BRINE FEED PUMP
CLOSE 23-XV-740, BRA-PUMP-202 SUCTION VALVE
CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE
CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY
DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY
CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY
DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY
CLOSE 23-LV-758A, BRA-DDYR-101 FEED
CLOSE 23-LV-759A, BRA-DDYR-102 FEED
CLOSE 23-LV-760A, BRA-DDYR-201 FEED
STOP BRA-DDYR-101 DRIVE
STOP BRA-DDYR-101 FEED PENDULUM
STOP BRA-DDYR-101 SCREW CONVEYOR "A"
STOP BRA-DDYR-101 SCREW CONVEYOR "B"
STOP BRA-DDYR-102 DRIVE
STOP BRA-DDYR-102 FEED PENDULUM
STOP BRA-DDYR-102 SCREW CONVEYOR "A"
STOP BRA-DDYR-102 SCREW CONVEYOR "B"
S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)
START BRA-PUMP-103 SUMP PUMP
START BRA-PUMP-104 SUMP PUMP
PRE-ALARM
ALARM

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	REMARKS
23	23-TISH-110	BRA-EVAP-101/201 TO DRUM DRYERS TEMP HIGH	240 F																																																		CON ALARM ONLY
24	23-TISHH-110	BRA-EVAP-101/201 TO DRUM DRYERS TEMP HIGH-HIGH	250 F	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																								X	CON ALARM ONLY. RCRA AWFCO BRA 3.
25	23-PSH-168	BRA-PUMP-101 SEAL POT AIR SUPPLY PRESS HIGH	**40 psig**																																																X	LOCAL ALARM ONLY.	CH1
26	23-XS-170	BRA-DDYR-101 COMMON TROUBLE	NA																																																X	CON ALARM ONLY.	
27	23-PSH-171	BRA-PUMP-102 SEAL POT AIR SUPPLY PRESS HIGH	**40 psig**																																																X	LOCAL ALARM ONLY.	CH1
28	23-LSH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH	1 in. from bottom																																																X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL.	
29	23-LSHH-173	BRA-EVAP-101 AREA SUMP LEVEL HIGH-HIGH	6" from top																																																X	CON ALARM ONLY.	
30	23-XS-175	BRA-DDYR-102 COMMON TROUBLE	NA																																																	X	CON ALARM ONLY.	
31	23-LSL-177	BRA-PUMP-101 SEAL POT LEVEL LOW	**As Mounted**																																																X	LOCAL ALARM ONLY.	CH1
32	23-LSL-178	BRA-PUMP-102 SEAL POT LEVEL LOW	**As Mounted**																																																X	LOCAL ALARM ONLY.	CH1
33	23-PSH-190	BRA-HEAT-110 DRM DRYER AIR HEATER DISCH PRESS HIGH	**5" wc**																																																X	CON ALARM ONLY.	CH1
34	23-XA-190	BRA-HEAT-110 DRM DRYER AIR HEATER MALF	MALF																																																X	CON ALARM ONLY.	
35	**23-ZX-191**	**BRA-HEAT-110 DAMPER LIMIT SWITCH**	**CLOSED**																																																**X**	IF ALL THREE DAMPERS (191,192,193) ARE CLOSED HEATER WILL S/D OR CAN'T BE STARTED	CH1
36	**23-ZX-192**	**BRA-HEAT-110 DAMPER LIMIT SWITCH**	**CLOSED**																																															**X**	SEE ABOVE	CH1
37	**23-ZX-193**	**BRA-HEAT-110 DAMPER LIMIT SWITCH**	**CLOSED**																																																**X**	SEE ABOVE	CH1
38	23-TAH-267	BRA-TANK-101 TEMPERATURE HIGH	**190°F**																																																X	CON ALARM ONLY. **ADDRESS:B1:851/00**	CH1
39	23-TAL-267	BRA-TANK-101 TEMPERATURE LOW	**170°F**																																																X	CON ALARM ONLY. **ADDRESS=B1:850/12**	CH1
40	23-TAH-268	BRA-TANK-102 TEMPERATURE HIGH	**190°F**																																																X	CON ALARM ONLY. **ADDRESS=B:850/02**	CH1
41	23-TAL-268	BRA-TANK-102 TEMPERATURE LOW	**170°F**																																																	X	CON ALARM ONLY. **ADDRESS=B1:850/14**	CH1
42	23-LSH-757	BRA-EVAP-101A LEVEL HIGH	80%																																																	X	LOCAL AND CON ALARM	
43	23-LSHH-757	BRA-EVAP-101A LEVEL HIGH-HIGH	90%				X					X																																									X	LOCAL AND CON ALARM. CLOSE 23-XV-935 (DEMISTER WASH WATER).	
44	23-LSL-757	BRA-EVAP-101A LEVEL LOW	25%																																																	X	LOCAL AND CON ALARM	
45	23-LSLL-757	BRA-EVAP-101A LEVEL LOW-LOW	15%																			X																														X	LOCAL AND CON ALARM	
46	23-LSH-758	BRA-DDYR-101 LEVEL HIGH	**10 in**																																																	X	LOCAL ALARM ONLY.	CH1

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-501, -502, -503, -504, -507

PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	03 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	04 STOP BRA-PUMP-101, BRINE FEED PUMP	05 CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE	06 CLOSE 23-XV-37, BRA-TANK-101 RECYCLE VALVE	07 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	08 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	09 STOP BRA-PUMP-102, BRINE FEED PUMP	10 CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE	11 CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE	12 STOP BRA-PUMP-201, BRINE FEED PUMP	13 CLOSE 23-XV-738, BRA PUMP-201 SUCTION VALVE	14 CLOSE 23-XV-737, BRA-TANK-201 RECYCLE VALVE	15 STOP BRA-PUMP-202, BRINE FEED PUMP	16 CLOSE 23-XV-740, BRA-PUMP-202 SUCTION VALVE	17 CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE	18 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	19 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	20 CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY	21 DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY	22 CLOSE 23-LV-758A, BRA-DDYR-101 FEED	23 CLOSE 23-LV-759A, BRA-DDYR-102 FEED	24 CLOSE 23-LV-760A, BRA-DDYR-201 FEED	25 STOP BRA-DDYR-101 DRIVE	26 STOP BRA-DDYR-101 FEED PENDULUM	27 STOP BRA-DDYR-101 SCREW CONVEYOR "A"	28 STOP BRA-DDYR-101 SCREW CONVEYOR "B"	29 STOP BRA-DDYR-102 DRIVE	30 STOP BRA-DDYR-102 FEED PENDULUM	31 STOP BRA-DDYR-102 SCREW CONVEYOR "A"	32 STOP BRA-DDYR-102 SCREW CONVEYOR "B"	33 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	34 START BRA-PUMP-103 SUMP PUMP	35 START BRA-PUMP-104 SUMP PUMP	36 PRE-ALARM	37 ALARM	REMARKS	
47	23-LSHH-758	BRA-DDYR-101 LEVEL HIGH-HIGH	12 in	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												X	RCRA AWFCO BRA 10. SETPOINT BASED ON TOCDF.	
48	23-LSL-758	BRA-DDYR-101 LEVEL LOW	**1 in**																																		X		LOCAL ALARM ONLY.	CH 1
49	23-LSH-759	BRA-DDYR-102 LEVEL HIGH	**10 in**																																		X		LOCAL ALARM ONLY.	CH 1
50	23-LSHH-759	BRA-DDYR-102 LEVEL HIGH-HIGH	12 in	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												X	RCRA AWFCO BRA 10. SETPOINT BASED ON TOCDF.	
51	23-LSL-759	BRA-DDYR-102 LEVEL LOW	**1 in**																																		X		LOCAL ALARM ONLY.	CH 1
52	23-XA-761	BRA-DDYR-101 PENDULUM OVERLOAD																											X									X	LOCAL ALARM ONLY.	
53	23-HS-761C	BRA-DDYR-101 PENDULUM E-STOP SWITCH																											X									X	LOCAL ALARM ONLY.	
54	23-XA-801	BRA-DDYR-102 PENDULUM OVERLOAD																																		X			X	LOCAL ALARM ONLY.	
55	23-HS-801C	BRA-DDYR-102 PENDULUM E-STOP SWITCH																																		X			X	LOCAL ALARM ONLY.	
56	23-PSL-821	BRA-DDYR-101 STEAM SUPPLY PRESSURE LOW	70 psig																																		X		LOCAL AND CON ALARM.	
57	23-PSL-822	BRA-DDYR-102 STEAM SUPPLY PRESSURE LOW	70 psig																																		X		LOCAL AND CON ALARM.	
58	23-XS-827	BRA-EVAP-101 LOCAL CONTROL PANEL COMMON TROUBLE	NA																																		X		CON ALARM ONLY.	
59	23-PDISH-828	BRA-PUMP-101 INLET STRAINER DIFF PRESS HIGH	**5 psid**																																		X		LOCAL ALARM ONLY.	CH 1
60	23-PDISH-829	BRA-PUMP-102 INLET STRAINER DIFF PRESS HIGH	**5 psid**																																		X		LOCAL ALARM ONLY.	CH 1
61	23-DAH-834	BRA-EVAP-101A RECIRC DENSITY HIGH	1.20 sg																																		X		LOCAL AND CON ALARM.	
62	23-DSHH-834	BRA-EVAP-101A RECIRC DENSITY HIGH-HIGH	1.25 sg	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												X	LOCAL AND CON ALARM. RCRA AWFCO BRA 1. ACTIVE ONLY WHEN FEEDING BRINE TO THE DRYERS.	
63	23-DAL-834	BRA-EVAP-101A RECIRC DENSITY LOW	1.06 sg																																		X		LOCAL AND CON ALARM. ONLY ACTIVATED WHEN FEEDING BRINE TO ANY DRYER (23-ZS-758B OR 23-ZS-759B OR 23-ZS-760B ARE NOT CLOSED)	
64	23-DALL-834	BRA-EVAP-101A RECIRC DENSITY LOW-LOW	1.05 sg	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												X	LOCAL AND CON ALARM. RCRA AWFCO BRA 2. ONLY ACTIVATED WHEN FEEDING BRINE TO ANY DRYER (23-ZS-758B OR 23-ZS-759B OR 23-ZS-760B ARE NOT CLOSED).	
65	23-ZS-834	BRA-EVAP-101A STEAM SUPPLY VALVE POSITION	CLOSED																				X																	23-XV-61 IS OPENED WHEN 23-ZS-834 IS NOT CLOSED	

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-501, -502, -503, -504, -507

PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE	03 STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR	04 STOP BRA-PUMP-101, BRINE FEED PUMP	05 CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE	06 CLOSE 23-XV-37, BRA-TANK-101 RECYCLE VALVE	07 CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE	08 STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR	09 STOP BRA-PUMP-102, BRINE FEED PUMP	10 CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE	11 CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE	12 STOP BRA-PUMP-201, BRINE FEED PUMP	13 CLOSE 23-XV-738, BRA PUMP-201 SUCTION VALVE	14 CLOSE 23-XV-737, BRA-TANK-201 RECYCLE VALVE	15 STOP BRA-PUMP-202, BRINE FEED PUMP	16 CLOSE 23-XV-740, BRA-PUMP-202 SUCTION VALVE	17 CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE	18 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	19 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	20 CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY	21 DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY	22 CLOSE 23-LV-758A, BRA-DDYR-101 FEED	23 CLOSE 23-LV-759A, BRA-DDYR-102 FEED	24 CLOSE 23-LV-760A, BRA-DDYR-201 FEED	25 STOP BRA-DDYR-101 DRIVE	26 STOP BRA-DDYR-101 FEED PENDULUM	27 STOP BRA-DDYR-101 SCREW CONVEYOR "A"	28 STOP BRA-DDYR-101 SCREW CONVEYOR "B"	29 STOP BRA-DDYR-102 DRIVE	30 STOP BRA-DDYR-102 FEED PENDULUM	31 STOP BRA-DDYR-102 SCREW CONVEYOR "A"	32 STOP BRA-DDYR-102 SCREW CONVEYOR "B"	33 S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)	34 START BRA-PUMP-103 SUMP PUMP	35 START BRA-PUMP-104 SUMP PUMP	36 PRE-ALARM	37 ALARM	REMARKS
66	23-TSH-836	BRA-EVAP-101A RECIRC TEMP HIGH	300 F																																	X		CON ALARM ONLY.
67	23-FSH-837	BRA-EVAP-101A FLOW FROM BRA-PUMP-101/102 HIGH	**37.2 GPM**																																	X		CON ALARM ONLY.
68	23-LSL-840	BRA-EVAP-101C (CIRC PUMP) SEAL POT LEVEL LOW	**As Mounted**																																	X		LOCAL ALARM ONLY.
69	23-PSH-840	BRA-EVAP-101C (CIRC PUMP) SEAL POT PRESS HIGH	35 psig																																	X		LOCAL ALARM ONLY.
70	23-IS-843	BRA-EVAP-101C (CIRC PUMP) CURRENT HIGH	**48 amps**																																	X		LOCAL ALARM ONLY.
71	23-LSL-844	BRA-EVAP-101D (CIRC PUMP) SEAL POT LEVEL LOW	**As Mounted**																																	X		LOCAL ALARM ONLY.
72	23-PSH-844	BRA-EVAP-101D (CIRC PUMP) SEAL POT PRESS HIGH	35 psig																																	X		LOCAL ALARM ONLY.
73	23-IS-846	BRA-EVAP-101D (CIRC PUMP) CURRENT HIGH	**48 amps**																																	X		LOCAL ALARM ONLY.
74	23-FQAH-851	BRA-DDYR-101 BRINE FEEDRATE HIGH	324 GPH				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X												X		**ADDRESS=B1:2620/04**
75	23-FQAHH-851	BRA-DDYR-101 BRINE FEEDRATE HIGH-HIGH	360 GPH	X			X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X												X		CON ALARM ONLY. RCRA AWFCO BRA 4. ROLLING ONE HOUR AVERAGE. NOTE 4. **ADDRESS=B1:2620/06**
76	23-HS-852C	BRA-DDYR-101 E-STOP SWITCH																							X												X		
77	23-XA-853	BRA-DDYR-101 DRIVE OVERLOAD																							X												X		LOCAL ALARM ONLY.
78	23-HS-859C	BRA-DDYR-101 SCREW CONVEYOR "A" E-STOP SWITCH																									X										X		
79	23-XA-860A	BRA-DDYR-101 SCREW CONVEYOR "A" OVERLOAD																									X										X		LOCAL ALARM ONLY.
80	23-XA-860C	BRA-DDYR-101 SCREW CONVEYOR "A" COVER																									X										X		LOCAL ALARM ONLY.
81	23-HS-862C	BRA-DDYR-101 SCREW CONVEYOR "B" E-STOP SWITCH																										X									X		
82	23-XA-863A	BRA-DDYR-101 SCREW CONVEYOR "B" OVERLOAD																										X									X		LOCAL ALARM ONLY.
83	23-XA-863C	BRA-DDYR-101 SCREW CONVEYOR "B" COVER																										X									X		LOCAL ALARM ONLY.
84	23-FQAH-872	BRA-DDYR-102 BRINE FEEDRATE HIGH	324 GPH																																	X		**ADDRESS=B1:2620/10**
85	23-FQAHH-872	BRA-DDYR-102 BRINE FEEDRATE HIGH-HIGH	360 GPH	X			X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X												X		CON ALARM ONLY. RCRA AWFCO BRA 4. ROLLING ONE HOUR AVERAGE. NOTE 4. **ADDRESS=B1:2620/12**
86	23-HS-873C	BRA-DDYR-102 E-STOP SWITCH																											X								X		
87	23-XA-874	BRA-DDYR-102 DRIVE OVERLOAD																											X								X		LOCAL ALARM ONLY.
88	23-HS-880C	BRA-DDYR-102 SCREW CONVEYOR "A" E-STOP SWITCH																												X							X		
89	23-XA-881A	BRA-DDYR-102 SCREW CONVEYOR "A" OVERLOAD																												X							X		LOCAL ALARM ONLY.

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 1 & COMMON EQUIPMENT

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-501, -502, -503, -504, -507

PLCs: ICS-CONR-108 AND LOCAL PLCs ICS-CONR-200, -201

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	REMARKS
		BRA RCRA AWFCO																																								
		CLOSE 23-LV-001, BRA-TANK-101 INLET VALVE																																								
		STOP BRA-AGIT-101, BRA-TANK-101 AGITATOR																																								
		STOP BRA-PUMP-101, BRINE FEED PUMP																																								
		CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE																																								
		CLOSE 23-XV-37, BRA-TANK-101 RECYCLE VALVE																																								
		CLOSE 23-LV-005, BRA-TANK-102 INLET VALVE																																								
		STOP BRA-AGIT-102, BRA-TANK-102 AGITATOR																																								
		STOP BRA-PUMP-102, BRINE FEED PUMP																																								
		CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE																																								
		CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE																																								
		STOP BRA-PUMP-201, BRINE FEED PUMP																																								
		CLOSE 23-XV-738, BRA PUMP-201 SUCTION VALVE																																								
		CLOSE 23-XV-737, BRA-TANK-201 RECYCLE VALVE																																								
		STOP BRA-PUMP-202, BRINE FEED PUMP																																								
		CLOSE 23-XV-740, BRA-PUMP-202 SUCTION VALVE																																								
		CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE																																								
		CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY																																								
		DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY																																								
		CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY																																								
		DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY																																								
		CLOSE 23-LV-758A, BRA-DDYR-101 FEED																																								
		CLOSE 23-LV-759A, BRA-DDYR-102 FEED																																								
		CLOSE 23-LV-760A, BRA-DDYR-201 FEED																																								
		STOP BRA-DDYR-101 DRIVE																																								
		STOP BRA-DDYR-101 FEED PENDULUM																																								
		STOP BRA-DDYR-101 SCREW CONVEYOR "A"																																								
		STOP BRA-DDYR-101 SCREW CONVEYOR "B"																																								
		STOP BRA-DDYR-102 DRIVE																																								
		STOP BRA-DDYR-102 FEED PENDULUM																																								
		STOP BRA-DDYR-102 SCREW CONVEYOR "A"																																								
		STOP BRA-DDYR-102 SCREW CONVEYOR "B"																																								
		S/D DRUM DRYER AIR HEATER (BLOWER & BURNER)																																								
		START BRA-PUMP-103 SUMP PUMP																																								
		START BRA-PUMP-104 SUMP PUMP																																								
		PRE-ALARM																																								
		ALARM																																								
90	23-XA-881C	BRA-DDYR-102 SCREW CONVEYOR "A" COVER																																X						X	LOCAL ALARM ONLY.
91	23-HS-883C	BRA-DDYR-102 SCREW CONVEYOR "B" E-STOP SWITCH																																	X					X	
92	23-XA-884A	BRA-DDYR-102 SCREW CONVEYOR "B" OVERLOAD																																	X					X	LOCAL ALARM ONLY.
93	23-XA-**884C**	BRA-DDYR-102 SCREW CONVEYOR "B" COVER																																	X					X	LOCAL ALARM ONLY
94	23-TSH-919	STEAM TO BRA-EVAP-101B (HT EXCH) TEMP HIGH	300 F																		X																		X	LOCAL ALARM ONLY.
95	23-KX-935A/B	BRA-EVAP-101A DEMISTER PAD SPRAY TIMER	NA																																					AUTOMATICALLY OPEN 23-XV-935 FOR 10 MIN EVERY 10 HOURS
96	**23-TSH-9042**	**BRA-HEAT-110 HIGH INLET TEMP**	**130°F**																																					**BURNER CUTOFF ONLY. SET HIGH FOR CONTINUOUS BURNER OPERATION**	CH 1
97	**23-PSL-9043**	**BRA-HEAT-110 AIR FLOW PROVING SWITCH**	**-.2"**																																	**X**				**LOCAL/CON ALARM via 23-XA-190**	CH 1
98	**23-TSH-9044**	**BRA-HEAT-110 HIGH DISCHARGE TEMP**	**190°F**																																	**X**				**LOCAL/CON ALARM via 23-XA-190**	CH 1
99	**23-DPSH-9050**	**BRA-HEAT-110 CLOGGED AIR FILTER**	**3"**																																					**LOCAL LIGHT INDICATION ONLY**	CH 1
100	**23-PSH-9801**	**BRA-HEAT-110 HIGH GAS PRESSURE**	**6.7 " w.c.**																																	**X**				**LOCAL/CON ALARM via 23-XA-190**	CH 1
101	**23-PSL-9801**	**BRA-HEAT-110 LOW GAS PRESSURE**	**2" w.c.**																																	**X**				**LOCAL/CON ALARM via 23-XA-190**	CH 1
102	27-HS-194	**AUTOMATIC** INITIATED BRA STOP-FEED	NA				X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												INITIATED FROM THE CON **BY AWFCO SIGNALS**	CH 1
103		4 BRA TANKS @ HI HI OR NOT SELECTED																																						RCRA AWFCO DFS-22, LIC-19, MPF-18. DICO TO DFS, LIC & MPF TO STOP FEED
104		BRA-EVAP-101C/101D (CIRC PUMP) NOT RUNNING	NOT RUNNING																		X																			

1 **DELETED** CH 1

2 BRINE FEED PUMPS WILL BE STOPPED THROUGH HARDWIRED INTERLOCKS IF ANY OF THE FOLLOWING CONDITIONS ARE SATISFIED: 1) 23-LSLLL-004 AND 23-LSLLL-008 ACTIVATED, 2) 23-LSLLL-004 AND 23-ZS-040A (not open) ACTIVATED, 3) 23-LSLLL-008 AND 23-ZS-038A (not open) ACTIVATED, 4) 23-ZS-038A (not open) AND 23-ZS-040A (not open) ACTIVATED

3. AT LEAST ONE BRA TANK INLET VALVE AND 23-XV-XXX SHALL BE OPEN AS A PERMISSIVE FOR THE REGENERATION WASTE TRANSFER PUMP (WTS-PUMP-103) TO OPERATE. LOSS OF PERMISSIVE SHALL CAUSE PUMP TO STOP.

4. 23-FQAH/FQAHH-42 HAVE BEEN DELETED AND 23-FQAH/FQAHH-851/872/903 HAVE BEEN ADDED TO THE MATRIX PER ECP-991. CH 1

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 2

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-511, -512, -513

PLCs: ICS-CONR-108 AND LOCAL PLC ICS-CONR-202

BRA RCRA AWFCO
CLOSE 23-LV-701, BRA-TANK-201 INLET VALVE
STOP BRA-AGIT-201, BRA-TANK-201 AGITATOR
STOP BRA-PUMP-201, BRINE FEED PUMP
CLOSE 23-XV-738, BRA-PUMP-201 SUCTION VALVE
CLOSE 23-XV-737, BRA TANK-201 RECYCLE VALVE
CLOSE 23-LV-705, BRA-TANK-202 INLET VALVE
STOP BRA-AGIT-202, BRA-TANK-202 AGITATOR
STOP BRA-PUMP-202, BRINE FEED PUMP
CLOSE 23-XV-740, BRA-PUMP-702 SUCTION VALVE
CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE
CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY
DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY
CLOSE 23-LV-760A, BRA-DDYR-201 FEED
STOP BRA-DDYR-201 DRIVE
STOP BRA-DDYR-201 FEED PENDULUM
STOP BRA-DDYR-201 SCREW FEEDER "A"
STOP BRA-DDYR-201 SCREW FEEDER "B"
START BRA-PUMP-204 SUMP PUMP
STOP BRA-PUMP-101, BRINE FEED PUMP
CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE
CLOSE 23-XV-37, BRA TANK-101 RECYCLE VALVE
STOP BRA-PUMP-102, BRINE FEED PUMP
CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE
CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE
CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY
DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY
CLOSE 23-LV-758A, BRA-DDYR-101 FEED
CLOSE 23-LV-759A, BRA-DDYR-102 FEED
PRE-ALARM
ALARM

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	REMARKS	
1	BRA-PANL-101	BRA PAS SYSTEM SHUTDOWN	NA				X	X	X			X	X	X	X	X	X					X	X	X	X	X	X	X	X	X					PERFORMED VIA PLC IN BRA-PANL-101	
2	23-PSH-174	BRA-PUMP-201 SEAL POT AIR SUPPLY PRESS HIGH	**40 psig**																															X	LOCAL ALARM ONLY.	CH 1
3	23-PSH-176	BRA-PUMP-202 SEAL POT AIR SUPPLY PRESS HIGH	**40 psig**																															X	LOCAL ALARM ONLY.	CH 1
4	23-LSL-179	BRA-PUMP-201 SEAL POT LEVEL LOW	**As Mounted**																															X	LOCAL ALARM ONLY.	CH 1
5	23-LSL-180	BRA-PUMP-202 SEAL POT LEVEL LOW	**As Mounted**																															X	LOCAL ALARM ONLY.	CH 1
6	23-ZS-701A	BRA-TANK-201 BRINE SURGE TANK INLET VALVE POSITION	OPEN																																NOTE 3	
7	23-LSHH-702	BRA-TANK-201 BRINE SURGE TANK HIGH HIGH	18'-3"		X																													X	HARDWIRED. LOCAL AND CON ALARM.	
8	23-LAH-703A	BRA-TANK-201 BRINE SURGE TANK HIGH	17'-9"		X																													X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. **ADDRESS=B1:1050/00**	CH 1
9	23-LAL-703A	BRA-TANK-201 BRINE SURGE TANK LOW	3'-6"																															X	CON ALARM ONLY. **ADDRESS=B1:1050/02**	CH 1
10	23-LSH-703B	BRA-TANK-201 BRINE SURGE TANK HIGH	17'-9"																															X	LOCAL ALARM ONLY.	
11	23-LSL-703B	BRA-TANK-201 BRINE SURGE TANK LOW	3'-6"																															X	LOCAL ALARM ONLY.	
12	23-LSLLL-704	BRA-TANK-201 BRINE SURGE TANK LOW LOW LOW	1'-3"				X					X																						X	HARDWIRED. CON ALARM ONLY. NOTE 2.	
13	23-ZS-705A	BRA-TANK-202 BRINE SURGE TANK INLET VALVE POSITION	OPEN																																NOTE 3	
14	23-LSHH-706	BRA-TANK-202 BRINE SURGE TANK HIGH HIGH	18'-3"							X																								X	HARDWIRED. LOCAL AND CON ALARM.	
15	23-LAH-707A	BRA-TANK-202 BRINE SURGE TANK HIGH	17'-9"							X																								X	CON ALARM ONLY. AFTER TIME DELAY, CON OPERATOR CAN MANUALLY REOPEN THE VALVE. **ADDRESS=B1:1050/04**	CH 1
16	23-LAL-707A	BRA-TANK-202 BRINE SURGE TANK LOW	3'-6"																															X	CON ALARM ONLY. **ADDRESS=B1:1050/06**	CH 1
17	23-LSH-707B	BRA-TANK-202 BRINE SURGE TANK HIGH	17'-9"																															X	LOCAL ALARM ONLY.	
18	23-LSL-707B	BRA-TANK-202 BRINE SURGE TANK LOW	3'-6"																															X	LOCAL ALARM ONLY.	
19	23-LSLLL-708	BRA-TANK-202 BRINE SURGE TANK LOW LOW LOW	1'-3"				X					X																						X	HARDWIRED. CON ALARM ONLY.	
20	23-LSH-720	BRA-EVAP-201A LEVEL HIGH	80%																															X	LOCAL AND CON ALARM	
21	23-LSHH-720	BRA-EVAP-201A LEVEL HIGH-HIGH	90%				X					X																						X	LOCAL AND CON ALARM. CLOSE 23-XV-725 (DEMISTER WASH WATER).	
22	23-LSL-720	BRA-EVAP-201A LEVEL LOW	25%																															X	LOCAL AND CON ALARM	
23	23-LSLL-720	BRA-EVAP-201A LEVEL LOW-LOW	15%												X																			X	LOCAL AND CON ALARM	
24	23-TSH-724	STEAM TO BRA-EVAP-201B (HT EXCH) TEMP HIGH	300 F												X																			X	LOCAL ALARM ALARM	
25	23-KX-725A/B	BRA-EVAP-201A DEMISTER PAD SPRAY TIMER	NA																																AUTOMATICALLY OPEN 23-XV-935 FOR 10 MIN EVERY 10 HOURS	
26	23-LSLL-729	BRA-TANK-201 BRINE SURGE TANK LOW LOW	3'-0"			X																												X	HARDWIRED. LOCAL ALARM ONLY.	
27	23-LSLL-732	BRA-TANK-202 BRINE SURGE TANK LOW LOW	3'-0"							X																								X	HARDWIRED. LOCAL ALARM ONLY.	
28	23-IS-734	BRA-EVAP-201D (CIRC PUMP) CURRENT HIGH	**48 amps**																															X	LOCAL ALARM ONLY.	CH 1
29	23-IS-735	BRA-EVAP-201C (CIRC PUMP) CURRENT HIGH	**48 amps**																															X	LOCAL ALARM ONLY.	CH 1
30	23-ZS-738A	BRA-TANK-201 DISCH VALVE POSITION	NOT OPEN				X					X																							NOTE 2.	
31	23-ZS-740A	BRA-TANK-202 DISCH VALVE POSITION	NOT OPEN				X					X																							NOTE 2.	

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 2

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-511, -512, -513

PLCs: ICS-CONR-108 AND LOCAL PLC ICS-CONR-202

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 CLOSE 23-LV-701, BRA-TANK-201 INLET VALVE	03 STOP BRA-AGIT-201, BRA-TANK-201 AGITATOR	04 STOP BRA-PUMP-201, BRINE FEED PUMP	05 CLOSE 23-XV-738, BRA-PUMP-201 SUCTION VALVE	06 CLOSE 23-XV-737, BRA TANK-201 RECYCLE VALVE	07 CLOSE 23-LV-705, BRA-TANK-202 INLET VALVE	08 STOP BRA-AGIT-202, BRA-TANK-202 AGITATOR	09 STOP BRA-PUMP-202, BRINE FEED PUMP	10 CLOSE 23-XV-740, BRA-PUMP-702 SUCTION VALVE	11 CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE	12 CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY	13 DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY	14 CLOSE 23-LV-760A, BRA-DDYR-201 FEED	15 STOP BRA-DDYR-201 DRIVE	16 STOP BRA-DDYR-201 FEED PENDULUM	17 STOP BRA-DDYR-201 SCREW FEEDER "A"	18 STOP BRA-DDYR-201 SCREW FEEDER "B"	19 START BRA-PUMP-204 SUMP PUMP	20 STOP BRA-PUMP-101, BRINE FEED PUMP	21 CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE	22 CLOSE 23-XV-37, BRA TANK-101 RECYCLE VALVE	23 STOP BRA-PUMP-102, BRINE FEED PUMP	24 CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE	25 CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE	26 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	27 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	28 CLOSE 23-LV-758A, BRA-DDYR-101 FEED	29 CLOSE 23-LV-759A, BRA-DDYR-102 FEED	30 PRE-ALARM	31 ALARM	REMARKS	
32	23-TAH-748	BRA-TANK-201 TEMPERATURE HIGH	**190°F**																														X	CON ALARM ONLY. **ADDRESS=B1:1051/00**	CH1
33	23-TAL-748	BRA-TANK-201 TEMPERATURE LOW	**170°F**																														X	CON ALARM ONLY. **ADDRESS=B1:1050/10**	CH1
34	23-TAH-749	BRA-TANK-202 TEMPERATURE HIGH	**190°F**																														X	CON ALARM ONLY. **ADDRESS=B1:1051/02**	CH1
35	23-TAL-749	BRA-TANK-202 TEMPERATURE LOW	**170°F**																														X	CON ALARM ONLY. **ADDRESS=B1:1050/12**	CH1
36	23-LSH-754	BRA-EVAP-201 AREA SUMP LEVEL HIGH	1 in. from bottom																														X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL	
37	23-LSHH-754	BRA-EVAP-201 AREA SUMP LEVEL HIGH-HIGH	6" from top																			X											X	CON ALARM ONLY	
38	23-XS-756	BRA-DDYR-201 COMMON TROUBLE	NA																														X	CON ALARM ONLY.	
39	23-LSH-760	BRA-DDYR-201 LEVEL HIGH	**10 in**																													X		LOCAL ALARM ONLY.	CH1
40	23-LSHH-760	BRA-DDYR-201 LEVEL HIGH-HIGH	12 in	X			X	X	X			X	X	X	X	X	X					X	X	X	X	X	X	X	X	X			X	RCRA AWFCO BRA 10. SETPOINT BASED ON TOCDF.	
41	23-LSL-760	BRA-DDYR-201 LEVEL LOW	**1 in**																														X	LOCAL ALARM ONLY.	CH1
42	23-PSH-817	BRA-EVAP-201D (CIRC PUMP) SEAL POT PRESS HIGH	35 psig																														X	LOCAL ALARM ONLY.	
43	23-PSH-818	BRA-EVAP-201C (CIRC PUMP) SEAL POT PRESS HIGH	35 psig																														X	LOCAL ALARM ONLY.	
44	23-LSL-819	BRA-EVAP-201D (CIRC PUMP) SEAL POT LEVEL LOW	**As Mounted**																														X	LOCAL ALARM ONLY.	CH1
45	23-LSL-820	BRA-EVAP-201C (CIRC PUMP) SEAL POT LEVEL LOW	**As Mounted**																														X	LOCAL ALARM ONLY.	CH1
46	23-PSL-823	BRA-DDYR-201 STEAM SUPPLY PRESSURE LOW	70 psig																													X		LOCAL AND CON ALARM.	
47	23-XS-826	BRA-EVAP-201 LOCAL CONTROL PANEL COMMON TROUBLE	NA																													X		CON ALARM ONLY.	
48	23-PDISH-830	BRA-PUMP-201 INLET STRAINER DIFF PRESS HIGH	**5 psid**																														X	LOCAL ALARM ONLY.	CH1
49	23-PDISH-831	BRA-PUMP-202 INLET STRAINER DIFF PRESS HIGH	**5 psid**																														X	LOCAL ALARM ONLY.	CH1
50	23-FSH-835	BRA-EVAP-201A FLOW FROM BRA-PUMP-201/202 HIGH	**37.2 GPM**																														X	CON ALARM ONLY.	CH1
51	23-DAH-887	BRA-EVAP-201A RECIRC DENSITY HIGH	1.20 sg																													X		LOCAL AND CON ALARM.	
52	23-DSHH-887	BRA-EVAP-201A RECIRC DENSITY HIGH-HIGH	1.25 sg	X			X	X	X			X	X	X	X	X	X					X	X	X	X	X	X	X	X	X			X	RCRA AWFCO BRA 1. ACTIVE ONLY WHEN FEEDING BRINE TO THE DRYERS. LOCAL AND CON ALARM	
53	23-DAL-887	BRA-EVAP-201A RECIRC DENSITY LOW	1.06 sg																													X		LOCAL AND CON ALARM.	
54	23-DALL-887	BRA-EVAP-201A RECIRC DENSITY LOW-LOW	1.05 sg	X			X	X	X			X	X	X	X	X	X					X	X	X	X	X	X	X	X	X			X	RCRA AWFCO BRA 2. ACTIVE ONLY WHEN FEEDING BRINE TO THE DRYERS. LOCAL AND CON ALARM	
55	23-TSH-887	BRA-EVAP-201A RECIRC TEMP HIGH	300 F																													X		CON ALARM ONLY.	
56	23-ZS-887	BRA-EVAP-201A STEAM SUPPLY VALVE POSITION	CLOSED													X																			23-XV-65 IS OPENED WHEN 23-ZS-887 IS NOT CLOSED.	
57	23-FQAH-903	BRA-DDYR-201 BRINE FEEDRATE HIGH	324 GPH																													X		**ADDRESS=B1:1000/04**	CH1

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRINE REDUCTION AREA - LINE 2

LOCATION: OUTSIDE AND PROCESS UTILITY BUILDING
AREA/SYSTEM: 23
P&IDs: UM-2-D-511, -512, -513

PLCs: ICS-CONR-108 AND LOCAL PLC ICS-CONR-202

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 CLOSE 23-LV-701, BRA-TANK-201 INLET VALVE	03 STOP BRA-AGIT-201, BRA-TANK-201 AGITATOR	04 STOP BRA-PUMP-201, BRINE FEED PUMP	05 CLOSE 23-XV-738, BRA-PUMP-201 SUCTION VALVE	06 CLOSE 23-XV-737, BRA TANK-201 RECYCLE VALVE	07 CLOSE 23-LV-705, BRA-TANK-202 INLET VALVE	08 STOP BRA-AGIT-202, BRA-TANK-202 AGITATOR	09 STOP BRA-PUMP-202, BRINE FEED PUMP	10 CLOSE 23-XV-740, BRA-PUMP-702 SUCTION VALVE	11 CLOSE 23-XV-739, BRA-TANK-202 RECYCLE VALVE	12 CLOSE 23-FV-887, BRA-EVAP-201B STEAM SUPPLY	13 DE-ENERGIZE/CLOSE 23-XV-65, DESUPERHEATER SUPPLY	14 CLOSE 23-LV-760A, BRA-DDYR-201 FEED	15 STOP BRA-DDYR-201 DRIVE	16 STOP BRA-DDYR-201 FEED PENDULUM	17 STOP BRA-DDYR-201 SCREW FEEDER "A"	18 STOP BRA-DDYR-201 SCREW FEEDER "B"	19 START BRA-PUMP-204 SUMP PUMP	20 STOP BRA-PUMP-101, BRINE FEED PUMP	21 CLOSE 23-XV-38, BRA-PUMP-101 SUCTION VALVE	22 CLOSE 23-XV-37, BRA TANK-101 RECYCLE VALVE	23 STOP BRA-PUMP-102, BRINE FEED PUMP	24 CLOSE 23-XV-40, BRA-PUMP-102 SUCTION VALVE	25 CLOSE 23-XV-39, BRA-TANK-102 RECYCLE VALVE	26 CLOSE 23-FV-834, BRA-EVAP-101B STEAM SUPPLY	27 DE-ENERGIZE/CLOSE 23-XV-61, DESUPERHEATER SUPPLY	28 CLOSE 23-LV-758A, BRA-DDYR-101 FEED	29 CLOSE 23-LV-759A, BRA-DDYR-102 FEED	30 PRE-ALARM	31 ALARM	REMARKS	
58	23-FQAHH-903	BRA-DDYR-201 BRINE FEEDRATE HIGH-HIGH	360 GPH	X			X	X	X			X	X	X	X	X	X					X	X	X	X	X	X	X	X	X		X	CON ALARM ONLY. RCRA AWFCO BRA 4. ROLLING ONE HOUR AVERAGE. NOTE 4. **ADDRESS=B1:1000/06**	CH1
59	23-HS-904C	BRA-DDYR-201 E-STOP SWITCH															X																X	LOCAL ALARM ONLY	
60	23-XA-905	BRA-DDYR-201 DRIVE OVERLOAD															X																X	LOCAL ALARM ONLY	
61	23-XA-907	BRA-DDYR-201 PENDULUM OVERLOAD																X															X	LOCAL ALARM ONLY	
62	23-HS-907C	BRA-DDYR-201 PENDULUM E-STOP SWITCH																X															X	LOCAL ALARM ONLY	
63	23-HS-912C	BRA-DDYR-201 SCREW CONVEYOR "A" E-STOP SWITCH																	X														X		
64	23-XA-913A	BRA-DDYR-201 SCREW CONVEYOR "A" OVERLOAD																	X														X	LOCAL ALARM ONLY	
65	23-XA-913C	BRA-DDYR-201 SCREW CONVEYOR "A" COVER																	X														X	LOCAL ALARM ONLY	
66	23-HS-915C	BRA-DDYR-201 SCREW CONVEYOR "B" E-STOP SWITCH																		X													X	LOCAL ALARM ONLY	
67	23-XA-916A	BRA-DDYR-201 SCREW CONVEYOR "B" OVERLOAD																		X													X	LOCAL ALARM ONLY	
68	23-XA-916C	BRA-DDYR-201 SCREW CONVEYOR "B" COVER																		X													X	LOCAL ALARM ONLY	
69	27-HS-194	**AUTOMATIC** INITIATED BRA STOP-FEED	NA				X	X	X			X	X	X	X	X	X						X	X	X	X	X	X	X	X	X			INITIATED FROM THE CON **BY AWFCO SIGNALS**	CH1
70		4 BRA TANKS @ HI HI OR NOT SELECTED																																RCRA AWFCO DFS-22, LIC-19, MPF-18. DICO TO DFS, LIC & MPF TO STOP FEED	
71		BRA-EVAP-201C/201D (CIRC PUMP) NOT RUNNING	NOT RUNNING												X																				

1. **DELETED** CH1
2. BRINE FEED PUMPS WILL BE STOPPED THROUGH HARDWIRED INTERLOCKS IF ANY OF THE FOLLOWING CONDITIONS ARE SATISFIED: 1) 23-LSLLL-704 AND 23-LSLLL-708 ACTIVATED, 2) 23-LSLLL-704 AND 23-ZS-740A (not open) ACTIVATED, 3) 23-LSLLL-708 AND 23-ZS-738A (not open) ACTIVATED, 4) 23-ZS-738A (not open) AND 23-ZS-740A (not open) ACTIVATED
3. AT LEAST ONE BRA TANK INLET VALVE AND 23-XV-XXX SHALL BE OPEN AS A PERMISSIVE FOR THE REGENERATION WASTE TRANSFER PUMP (WTS-PUMP-103) TO OPERATE. LOSS OF PERMISSIVE SHALL CAUSE PUMP TO STOP.
4. 23-FQAH/FQAHH-42 HAVE BEEN DELETED AND 23-FQAH/FQAHH-851/872/903 HAVE BEEN ADDED TO THE MATRIX PER ECP-991. CH1

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY

ALARM AND INTERLOCK MATRIX

BRA POLLUTION ABATEMENT SYSTEM

LN	TAG NUMBER	DESCRIPTION	SETPOINT	01 BRA RCRA AWFCO	02 SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	03 SHUTDOWN BRA PAS BURNER	04 START BRA-PUMP-105	05 PRE-ALARM	06 ALARM	REMARKS	
1	27-LSH-093	BRA-SEPA-104 BRA PAS BAGHOUSE 104 LEVEL HIGH	**96"**					X		CON ALARM ONLY.	CH 1
2	27-LSH-094	BRA-SEPA-103 BRA PAS BAGHOUSE 103 LEVEL HIGH	**96"**					X		CON ALARM ONLY.	CH 1
3	27-LSH-095	BRA-SEPA-102 BRA PAS BAGHOUSE 102 LEVEL HIGH	**96"**					X		CON ALARM ONLY.	CH 1
4	27-LSH-096	BRA-SEPA-101 BRA PAS BAGHOUSE 101 LEVEL HIGH	**96"**					X		CON ALARM ONLY.	CH 1
5	27-PDAH-**143B**	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH	11 in wc					X		LOCAL AND CON ALARM.	CH 1
6	27-PDAHH-**143B**	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS HIGH HIGH	12 in wc	X					X	RCRA AWFCO BRA 6. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
7	27-PDAL-**143B**	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS LOW	0.5 in wc					X		LOCAL AND CON ALARM	CH 1
8	27-PDALL-**143B**	BRA-SEPA-101 BRA PAS BAGHOUSE 101 DIFF PRESS LOW LOW	0.3 in wc	X					X	RCRA AWFCO BRA 7. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
9	27-PDAH-**144B**	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH	11 in wc					X		LOCAL AND CON ALARM	CH 1
10	27-PDAHH-**144B**	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS HIGH HIGH	12 in wc	X					X	RCRA AWFCO BRA 6. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
11	27-PDAL-**144B**	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS LOW	0.5 in wc					X		LOCAL AND CON ALARM	CH 1
12	27-PDALL-**144B**	BRA-SEPA-102 BRA PAS BAGHOUSE 102 DIFF PRESS LOW LOW	0.3 in wc	X					X	RCRA AWFCO BRA 7. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
13	27-PDAH-**145B**	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH	11 in wc					X		LOCAL AND CON ALARM	CH 1
14	27-PDAHH-**145B**	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS HIGH HIGH	12 in wc	X					X	RCRA AWFCO BRA 6. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
15	27-PDAL-**145B**	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS LOW	0.5 in wc					X		LOCAL AND CON ALARM	CH 1
16	27-PDALL-**145B**	BRA-SEPA-103 BRA PAS BAGHOUSE 103 DIFF PRESS LOW LOW	0.3 in wc	X					X	RCRA AWFCO BRA 7. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
17	27-ZS-150B	BRA PAS EXHAUST BLOWER INLET DAMPER	CLOSED			X				INPUT TO BRA-PANL-102 (FSSS)	
18	27-FSH-151	BRA-STAK-102 BRA PAS STACK FLOW HIGH	**67,200 SCFM**					X		LOCAL ALARM ONLY.	CH 1
19	27-FSL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW	**16,800 SCFM**					X		LOCAL ALARM ONLY.	CH 1
20	27-FSLL-151	BRA-STAK-102 BRA PAS STACK FLOW LOW LOW	**14,700 SCFM**			X			X	LOCAL ALARM ONLY. RESPONSE ONLY WHEN CONCURRENT WITH 27-PSH-328.	CH 1
21	27-ZS-163A	BRA-EVAP-101A EXHAUST TO BRA PAS BYPASS DAMPER	OPEN					X		CON ALARM ONLY.	
22	27-ZS-164B	BRA-EVAP-101A EXHAUST DAMPER TO BRA PAS	CLOSED					X		CON ALARM ONLY.	
23	27-TSH-168	BRA PAS BAGHOUSE INLET TEMP HIGH	275 ^{o}F							INPUT TO BRA-PANL-102 (FSSS). **LOCAL ALARM/PERMISSIVE. REQUIRES RESET AFTER TRIP OF BRA PAS BURNER 110**	CH 1
24	27-BSLL-170	BRA PAS BURNER	FLAME LOSS	X						RCRA AWFCO BRA 8 VIA 27-XA-204. SEE NOTE 2.	
25	27-TAH-**172**	BRA PAS BAGHOUSE INLET TEMP HIGH	270 F					X		LOCAL ALARM ONLY. **LOCAL AND CON ALARM. DISCREET INPUT FROM PANEL 101.**	CH 1
26	27-TAHH-**172**	BRA PAS BAGHOUSE INLET TEMP HIGH HIGH	275 F	X					X	RCRA AWFCO BRA 5. LOCAL AND CON ALARM. **DISCREET INPUT FROM PANEL 101.** SEE NOTE 2.	CH 1
27	27-TAHHH-**172**	BRA PAS BAGHOUSE INLET TEMP HIGH HIGH HIGH	280 F			X			X	**LOCAL AND CON ALARM. DISCREET INPUT FROM PANEL 101**	CH 1
28	27-TAL-172	BRA PAS BAGHOUSE INLET TEMP LOW	225 F					X		LOCAL ALARM.	CH 1
29	27-PDAH-**186B**	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS HIGH	11 in wc					X		LOCAL AND CON ALARM.	CH 1

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
ALARM AND INTERLOCK MATRIX

BRA POLLUTION ABATEMENT SYSTEM

LN	TAG NUMBER	DESCRIPTION	SETPOINT	BRA RCRA AWFCO SHUTDOWN BRA-BLOW-102 BRA PAS EXHAUST BLOWER	SHUTDOWN BRA PAS BURNER	START BRA-PUMP-105	PRE-ALARM	ALARM		REMARKS	
				01	02	03	04	05	06		
30	27-PDAHH-**186B**	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS HIGH HIGH	12 in wc	X					X	RCRA AWFCO BRA 6. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
31	27-PDAL-**186B**	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS LOW	0.5 in wc					X		LOCAL AND CON ALARM.	CH 1
32	27-PDALL-**186B**	BRA-SEPA-104 BRA PAS BAGHOUSE 104 DIFF PRESS LOW LOW	0.3 in wc	X					X	RCRA AWFCO BRA 7. LOCAL AND CON ALARM. SEE NOTE 2.	CH 1
33	27-ZS-263A	BRA-EVAP-201A EXHAUST TO BRA PAS BYPASS DAMPER	OPEN					X		CON ALARM ONLY.	
34	27-ZS-264B	BRA-EVAP-201A EXHAUST DAMPER TO BRA PAS	CLOSED					X		CON ALARM ONLY.	
35	27-PSL-300	BRA PAS BURNER FUEL GAS PRESSURE LOW	**.5 PSI**			X				INPUT TO BRA-PANL-102 (FSSS)	CH 1
36	27-PSH-302	BRA PAS BURNER FUEL GAS PRESSURE HIGH	**3 PSI**			X				INPUT TO BRA-PANL-102 (FSSS)	CH 1
37	27-PSL-306	BRA PAS BURNER COMBUSTION AIR PRESSURE LOW	**8" w.c.**			X				INPUT TO BRA-PANL-102 (FSSS)	CH 1
38	27-XA-325	BRA-BLOW-102 BRA PAS EXHAUST BLOWER COMMON TROUBLE	NA						X	CON ALARM ONLY. RESPONSE TO BE DETERMINED.	
39	27-PSH-328	BRA PAS BAGHOUSE INLET PRESSURE HIGH	**-1" w.c.**			X			X	LOCAL ALARM ONLY. RESPONSE ONLY WHEN CONCURRENT WITH 27-FSLL-151.	CH 1
40	27-LSH-401	BRA PAS SUMP LEVEL HIGH	1 in. from bottom						X	CON ALARM ONLY. S/D SUMP PUMP ON DECREASING LEVEL.	
41	27-LSHH-401	BRA PAS SUMP LEVEL HIGH HIGH	6" from top				X		X	CON ALARM ONLY	
42	BRA-BLOW-102	BRA PAS EXHAUST BLOWER	MOTOR FAILURE		**X**	X			**X**	INPUT TO BRA-PANL-102 (FSSS). PANEL ALARM.	CH 1
43	MON-AAH-152	BRA-STAK-102 BRA PAS STACK ACAMS	**1.0 ASC**	**X**					**X**	**RCRA AWFCO BRA 9. CON ALARM ONLY. SEE NOTE 2.**	CH 1

1. **DELETED** CH 1
2. THE FOLLOWING RCRA AWFCO ALARMS ARE COMMON TO BOTH TRAINS: 27-TAHH-**172**, 27-PDAHH-143B/144B/145B/186B, 27-PDALL-143B/144B/145B/186B, 27-BSLL-170, MON-**AAH**-152. ALARM ACTIVATION WILL S/D EVAPORATORS (INCLUDING BRINE FEED PUMPS & ASSOCIATED SUCTION AND RECIRC VALVES) AND DRUM DRYERS VIA A COMMON DRY CONTACT INPUT TO THE PLC IN BRA-PANL-101. CH 1 CH 1
3. SETPOINT BASED ON ALLOWABLE STACK CONCENTRATION (ASC) FOR CHEMICAL AGENTS (mg/m3): GB=0.0003, HD=0.03, VX=0.0003.
4. 27-ZS-130B, RCRA AWFCO BRA 11, HAS BEEN DELETED FROM THE A&I MATRIX PER ECP-881. CH 1

APPENDIX D

PLC Automatic Control Sequences

Appendix D contains a summary of PLC automatic control sequences based on the current versions of the PLC code for each of the sites.

The PLC automatic control sequence summaries were generated based on the control system rung ladders in the PLC code for the brine reduction area. The operator interface with the PLCs, the Advisor PC system, stores device information in a database that consists of *tags*, or database records used for storing all necessary information related to a device that is monitored or controlled by the Advisor PC system. **D6** tags are used for discrete devices that may be controlled from the CON. In this appendix, automatic control for all devices with **D6** tags are described, grouped by the Advisor PC screens on which they appear. Details related to **D6-**device format can be found in the CSDP Control Systems Software Design Guide. Note that Advisor PC tag numbers may not match P&ID tag numbers exactly since Advisor PC tag numbers are labels in the code that refer to a device that may be more encompassing than the P&ID device.

Because the BRA PLC automatic control sequences are to be similar for all four sites, the control sequences will be listed in a single table (Tables D.1) with annotations in the description to indicate the differences, if any, between the control for the device at the different sites.

D.1 BRA PLC Automatic Control Sequences

The BRA is primarily controlled by the BRA equipment manufacturer supplied PLCs, with a few exceptions. At all sites, brine flow into the brine surge tanks from the PAS/PFS is controlled by opening/closing the brine surge tank inlet valves through PLC ICS-CONR-108. At follow-on sites, there are one or more controllers that will require input from a CON operator on an Advisor screen. At all follow-on sites, ICS-CONR-108 controller 23-FIC-830A [-888A] controls steam flow to the evaporator heat exchanger to maintain the specific gravity setpoint entered in the controller. PBCDF has an additional ICS-CONR-108 controller, 23-FIC-831, which controls flow back to the brine surge tanks to maintain a constant flow from the evaporator (see FAWB Note B-15).

Control logic for the TOCDF and UMCDF devices controlled by ICS-CONR-108 for each of the two lines are listed in Table D.1. The information in the tables is based on the TOCDF control system rung ladders as of September 2001 and UMCDF control system rung ladders as of January 2002. ANCDF code is also available, but since they do not plan to operate the BRA, the logic is not included (see FAWB Note B-5). Each BRA line has 1 Advisor PC Screen associated with its operation. The screens described in this appendix are Brine Reduction Line 1 (BR1) and Brine Reduction Line 2 (BR2). At UMCDF, ANCDF, and PBCDF, two new screens have been added: BRD for the line 1

drum dryers and drum air heater, and BPS for the BRA PAS system. ANCDF and PBCDF will not have screen BR2. The Jan 2002 UMCDF code did not have any **D6**-tag devices associated with screens BRD and BPS.

Table D.1. TOCDF and UMCDF BRA PLC Automatic Control Sequence Advisor PC Screens: **BR1 & BR2**

Device:	**BRA-TANK-101 Brine Fill Valve**
Advisor PC Screen:	BR1
Advisor PC Tag:	X23HS18
CONR:	C108
Driver Word:	0860
Driver Type:	3 (Manual Only)
Auto Open:	None
Open I-Lock:	The following conditions must be satisfied to allow the device to open: • 23-LSHH-002 (BRA-TANK-101 Level High High alarm) is not active • 23-HS-033A (BRA-TANK-101 Tank Selected to be Emptied) is not active
Note:	23-LAH-003 (BRA-TANK-101 Level High alarm) will initially cause the valve to close. This interlock is bypassed after a time delay, allowing the CON operator to manually re-open the valve.
Device:	**BRA-TANK-102 Brine Fill Valve**
Advisor PC Screen:	BR1
Advisor PC Tag:	X23HS22
CONR:	C108
Driver Word:	0861
Driver Type:	3 (Manual Only)
Auto Open:	None
Open I-Lock:	The following conditions must be satisfied to allow the device to open: • 23-LSHH-006 (BRA-TANK-102 Level High High alarm) is not active • 23-HS-033B (BRA-TANK-102 Tank Selected to be Emptied) is not active
Note:	23-LAH-007 (BRA-TANK-102 Level High alarm) will initially cause the valve to close. This interlock is bypassed after a time delay, allowing the CON operator to manually re-open the valve.

Table D.1. TOCDF and UMCDF BRA PLC Automatic Control Sequence Advisor PC Screens: **BR1 & BR2**	
Device:	**BRA-TANK-201 Brine Fill Valve**
Advisor PC Screen:	BR2
Advisor PC Tag:	X23HS718
CONR:	C108
Driver Word:	1060
Driver Type:	3 (Manual Only)
Auto Open:	None
Open I-Lock:	The following conditions must be satisfied to allow the device to open: • 23-LSHH-702 (BRA-TANK-201 Level High High alarm) is not active • 23-HS-733A (BRA-TANK-201 Tank Selected to be Emptied) is not active
Note:	23-LAH-703 (BRA-TANK-201 Level High alarm) will initially cause the valve to close. This interlock is bypassed after a time delay, allowing the CON operator to manually re-open the valve.
Device:	**BRA-TANK-202 Brine Fill Valve**
Advisor PC Screen:	BR2
Advisor PC Tag:	X23HS722
CONR:	C108
Driver Word:	1061
Driver Type:	3 (Manual Only)
Auto Open:	None
Open I-Lock:	The following conditions must be satisfied to allow the device to open: • 23-LSHH-706 (BRA-TANK-202 Level High High alarm) is not active • 23-HS-733B (BRA-TANK-202 Tank Selected to be Emptied) is not active
Note:	23-LAH-707 (BRA-TANK-202 Level High alarm) will initially cause the valve to close. This interlock is bypassed after a time delay, allowing the CON operator to manually re-open the valve.

APPENDIX E

Operator Screens

Appendix E contains the Advisor PC screens associated with operation and control of the TOCDF and UMCDF BRA systems. The TOCDF BRA screens are based on the TOCDF control code as of May 1998, and the UMCDF BRA screens are based on the UMCDF control code as of January 2002. Older TOCDF screens are included since they reflect the TOCDF configuration at the time when they were operating the BRA. ANCDF screens are also available, but since they do not plan to operate the BRA, the screens are not included (see FAWB Note B-5). When PBCDF BRA Advisor PC screens are available, they will be included in this appendix.

Table E.1 BRA Advisor PC Screens

Figure #	Advisor PC Screen Name	Process Screen
E-1	TOCDF Brine Reduction Line #1	BR1
E-2	TOCDF Brine Reduction Line #2	BR2
E-3	UMCDF Brine Reduction Line #1	BR1
E-4	UMCDF Brine Reduction Line #2	BR2
E-5	UMCDF BRA Dryers Line #1	BRD
E-6	UMCDF BRA PAS System	BPS

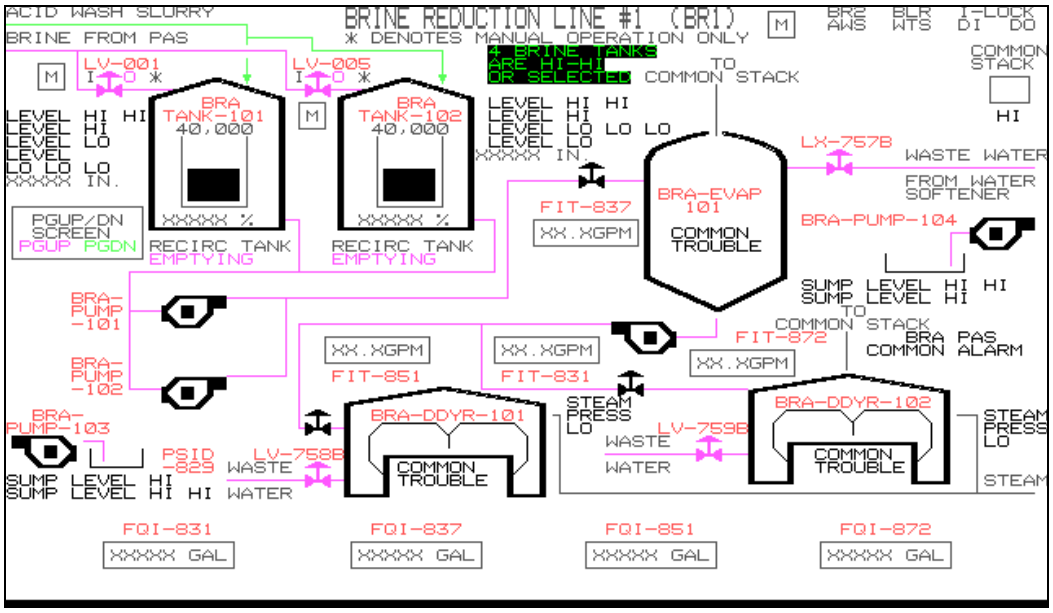

Figure E-1. TOCDF Advisor PC Screen Brine Reduction Line #1 (BR1)

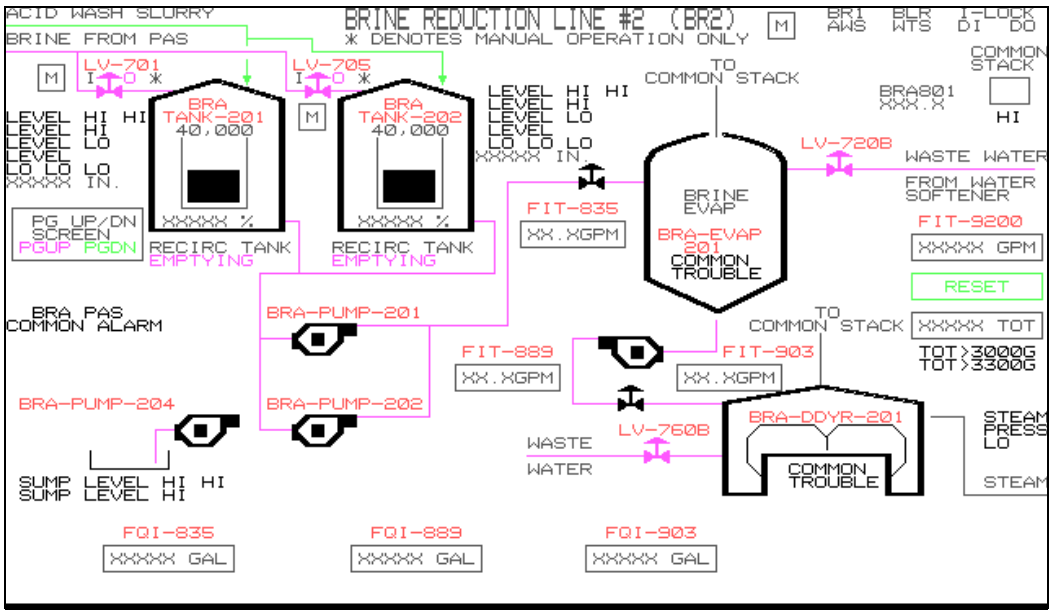

Figure E-2. TOCDF Advisor PC Screen Brine Reduction Line #2 (BR2)

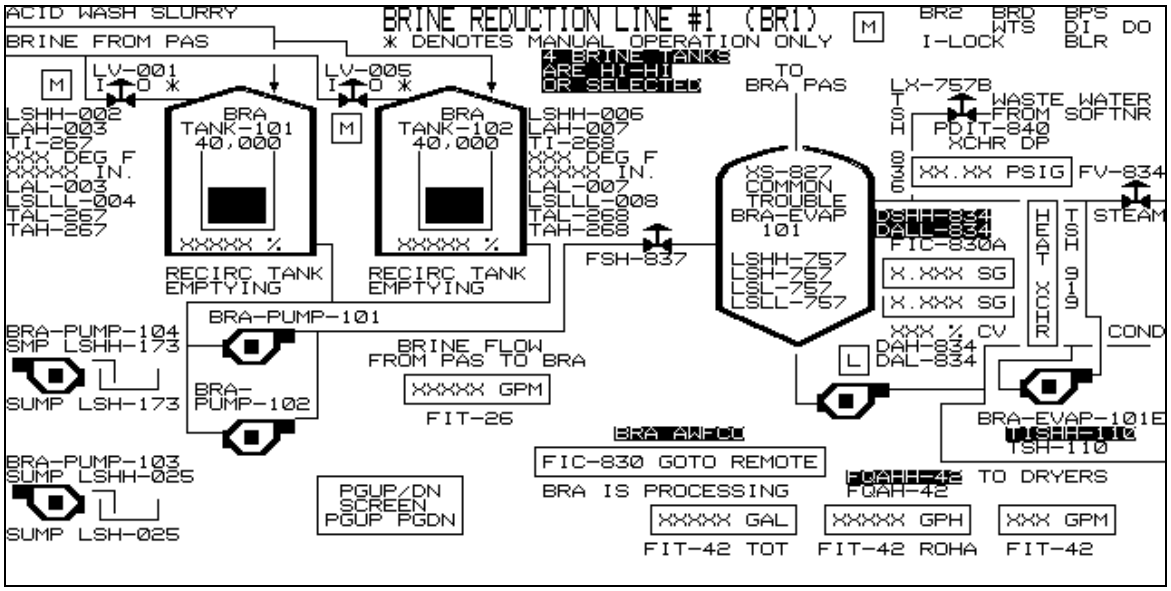

Figure E-3. UMCDF Advisor PC Screen Brine Reduction Line #1 (BR1)

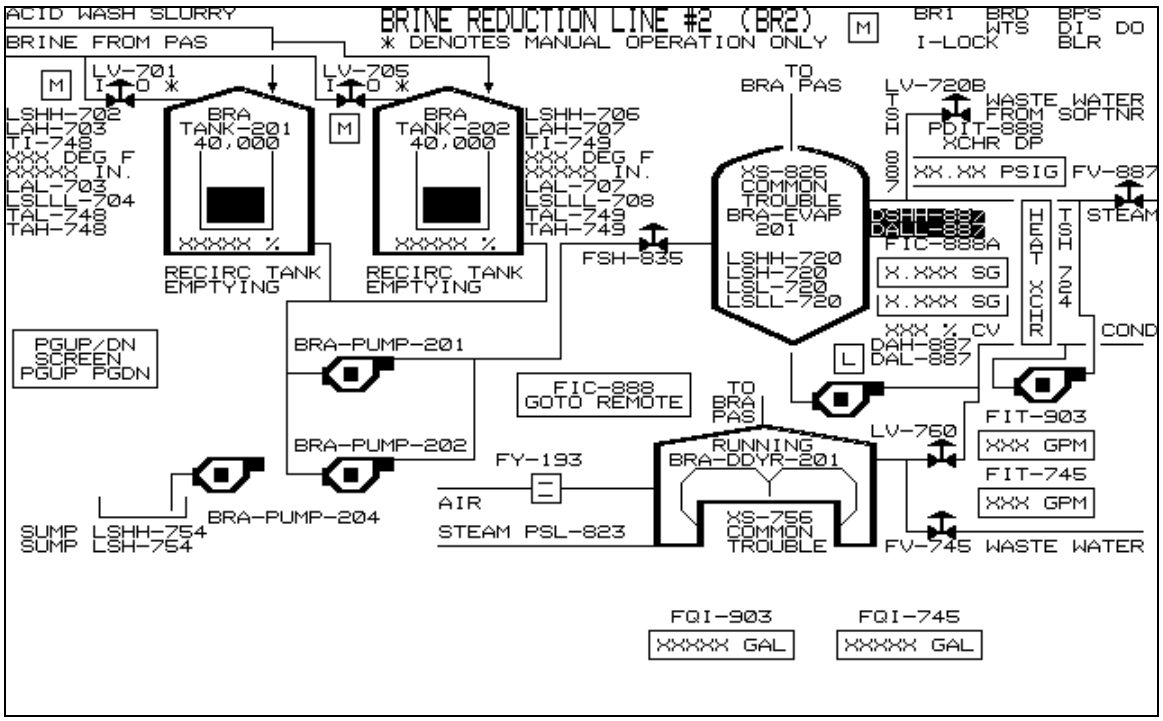

Figure E-4. UMCDF Advisor PC Screen Brine Reduction Line #2 (BR2)

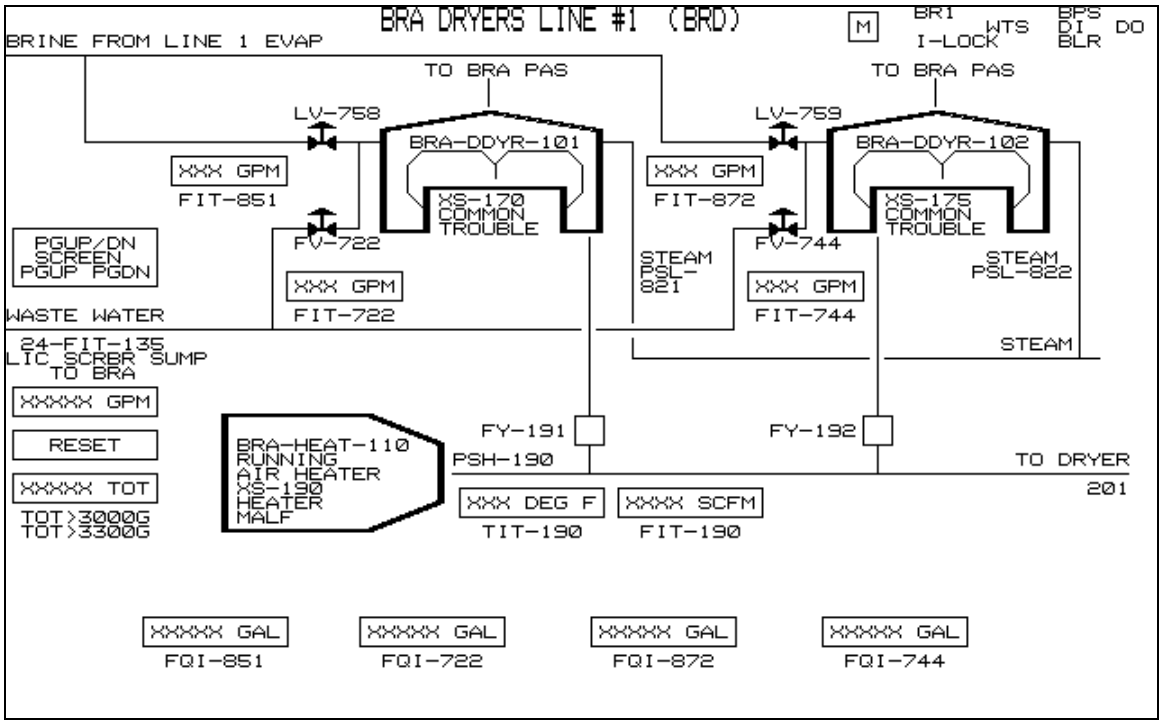

Figure E-5. UMCDF Advisor PC Screen BRA Dryers Line #1 (BRD)

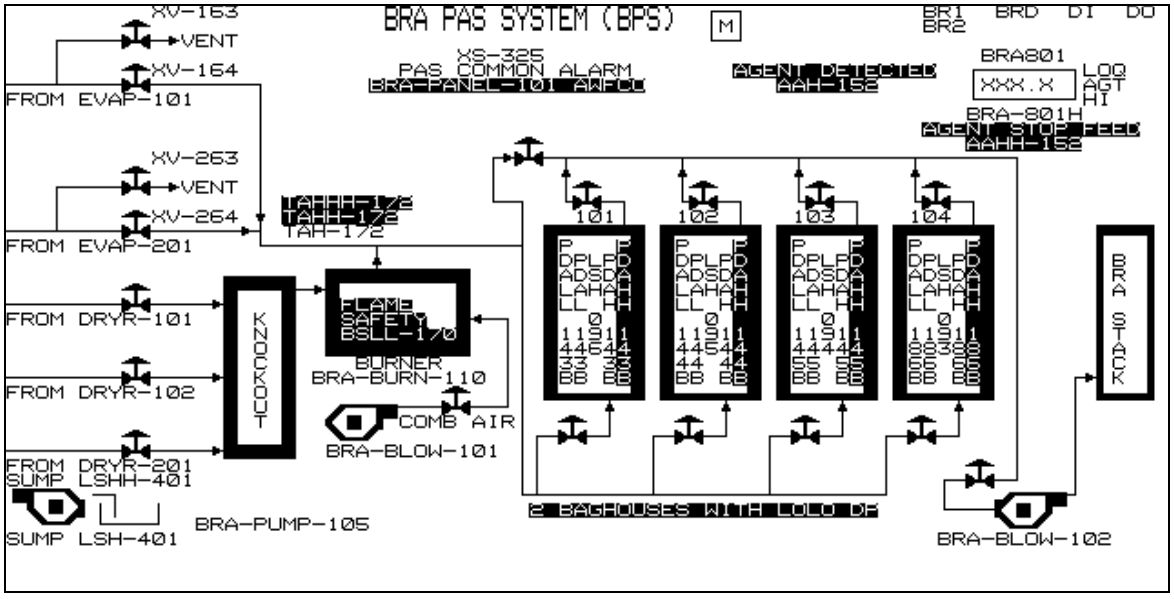

Figure E-6. UMCDF Advisor PC Screen BRA PAS System (BPS)

APPENDIX F

Instrument Ranges

Tables F.1 and F.2 show the instrument data extracted from the TOCDF Loveland calibration database for BRA and BRA PAS instrumentation, respectively, as of August 2000. Not all instrument tag numbers listed are part of the design at ANCDF, PBCDF, and UMCDF.

Table F.1 BRA Instrumentation in TOCDF Loveland Instrument Calibration Database

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
23-DR-834	Yes	4	20	mA	1	1.3	sg		BRA-HEAT-101B Brine Heat Ex Density Recorder
23-DR-887	Yes	4	20	mA	1	1.3	sg		BRA-HEAT-201B Brine Heat Ex Density Recorder
23-FI-835	No	4	20	mA	0	40	gpm		BRA-EVAP-201A Brine Feed Flow
23-FI-837	No	4	20	mA	0	40	gpm		BRA-EVAP-101A Brine Feed Flow
23-FI-847	No	4	20	mA	0	1996	lb/hr		BRA-DDYR-101 Steam Supply Flow
23-FI-868	No	4	20	mA	0	1996	lb/hr		BRA-DDYR-102 Steam Supply Flow
23-FI-899	No	4	20	mA	0	1996	lb/hr		BRA-DDYR-201 Steam Supply Flow
23-FI-9100	No	4	20	mA	0	20,000	scfm		Drum Dryer Air Heater Discharge
23-FIT-830	No	0	100	in. wc.	4	20	mA		BRA-HEAT-101B Steam Flow
23-FIT-847	No	0	1129	Hz	4	20	mA		BRA-DDYR-101 Steam Supply Flow
23-FIT-868	No	0	1129	Hz	4	20	mA		BRA-DDYR-102 Steam Supply Flow
23-FIT-888	No	4	100	in. wc.	4	20	mA		BRA-HEAT-201B Steam Supply Flow
23-FIT-899	No	0	1129	Hz	4	20	mA		BRA-DDYR-201 Steam Supply Flow
23-FSHH-835	Yes	4	20	mA	0	0		15.9	BRA-EVAP-201A Brine Feed Flow
23-FSHH-837	Yes	4	20	mA	0	0		15.9	BRA-EVAP-101A Brine Feed Flow

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
23-FSL-9102	No	4	20	mA	0	0		13.6	Brine Unload Station
23-FT-100	No	0	0.1141	in. wc.	4	20	mA		Drum Dryer Air Heater Discharge
23-FY-834	No	4	20	mA	3	15	psig		BRA-HEAT-101B 135 PSIG Steam Supply
23-FY-887	No	4	20	mA	3	15	psig		BRA-HEAT-201B 135 PSIG Steam Supply
23-II-734	No	0	5	Amp	0	100	%		BRA-PUMP-201D Current
23-II-735	No	0	5	Amp	0	100	%		BRA-PUMP-201C Current
23-II-843	No	0	5	Amp	0	100	%		BRA-PUMP-101C Current
23-II-846	No	0	5	Amp	0	100	%		BRA-PUMP-101D Current
23-LI-003B	No	4	20	mA	0	100	%		BRA-TANK-101 Brine Surge Tank
23-LI-007B	No	4	20	mA	0	100	%		BRA-TANK-102 Brine Surge Tank
23-LI-703B	No	4	20	mA	0	100	%		BRA-TANK-201 Brine Surge Tank
23-LI-707B	No	4	20	mA	0	100	%		BRA-TANK-202 Brine Surge Tank
23-LIT-720	Yes	0	100	in. wc.	4	20	mA		BRA-EVAP-201A Brine Flash Evap
23-LIT-757	Yes	0	100	in. wc.	4	20	mA		BRA-EVAP-101A Brine Flash Evap
23-LIT-758	No	0	14	in. wc.	4	20	mA		BRA-DDYR-101 Drum Dryer
23-LIT-759	No	0	14	in. wc.	4	20	mA		BRA-DDYR-102 Drum Dryer
23-LIT-760	No	0	14	in. wc.	4	20	mA		BRA-DDYR-201 Drum Dryer
23-LSH-003B	No	4	20	mA	0	0		18.5	BRA-TANK-101 Brine Surge Tank
23-LSH-007B	No	4	20	mA	0	0		18.5	BRA-TANK-102 Brine Surge Tank
23-LSH-703B	No	4	20	mA	0	0		18.5	BRA-TANK-201 Brine Surge Tank
23-LSH-707B	No	4	20	mA	0	0		18.5	BRA-TANK-202 Brine Surge Tank

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
23-LSH-720	Yes	4	20	mA	0	0		16.3	BRA-EVAP-201A Brine Flash Evap
23-LSH-757	Yes	4	20	mA	0	0		16.3	BRA-EVAP-101A Brine Flash Evap
23-LSHH-720	Yes	4	20	mA	0	0		17.28	BRA-EVAP-201A Brine Flash Evap
23-LSHH-757	Yes	4	20	mA	0	0		17.28	BRA-EVAP-101A Brine Flash Evap
23-LSHH-758	Yes	4	20	mA	0	0		15.42	BRA-DDYR-101 BRA Drum Dryer
23-LSHH-759	Yes	4	20	mA	0	0		15.42	BRA-DDYR-102 BRA Drum Dryer
23-LSHH-760	No	4	20	mA	0	0		15.42	BRA-DDYR-201 BRA Drum Dryer
23-LSL-003B	No	4	20	mA	0	0		7	BRA-TANK-101 Brine Surge Tank
23-LSL-007B	No	4	20	mA	0	0		7	BRA-TANK-102 Brine Surge Tank
23-LSL-703B	No	4	20	mA	0	0		7	BRA-TANK-201 Brine Surge Tank
23-LSL-707B	No	4	20	mA	0	0		7	BRA-TANK-202 Brine Surge Tank
23-LSL-720	No	4	20	mA	0	0		10.56	BRA-EVAP-201A Brine Flash Evap
23-LSL-757	No	4	20	mA	0	0		10.56	BRA-EVAP-101A Brine Flash Evap
23-LSLL-720	No	4	20	mA	0	0		4.8	BRA-EVAP-201A Brine Flash Evap
23-LSLL-757	No	4	20	mA	0	0		4.8	BRA-EVAP-101A Brine Flash Evap
23-PDI-101	No	4	20	mA	0	20,000	scfm		BRA-DDYR-101 Heated Air Supply
23-PDI-102	No	4	20	mA	0	20,000	scfm		BRA-DDYR-102 Heated Air Supply
23-PDI-201	No	4	20	mA	0	20,000	scfm		BRA-DDYR-201 Heated Air Supply
23-PDSH-9020	No	0	1	in. wc.	0	0		0.35	Drum Dryer Air Heater
23-PDSL-9023	No	0	2	in. wc.	0	0		0.07	Drum Dryer Air Heater Air Purge
23-PDSL-9321	No	0.5	80	psi	0	0		27	HPC-RCVR-101 Steam Trap
23-PDSL-9322	No	0.5	80	psi	0	0		27	HPC-RCVR-101 Steam Trap

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
23-PDSL-9421	No	0.5	80	psi	0	0		27	HPC-RCVR-102 Steam Trap
23-PDSL-9422	No	0.5	80	psi	0	0		27	HPC-RCVR-102 Steam Trap
23-PDSL-9521	No	0.5	80	psi	0	0		27	HPC-RCVR-103 Steam Trap
23-PDSL-9522	No	0.5	80	psi	0	0		27	HPC-RCVR-103 Steam Trap
23-PSH-9012	No	0	16	in. wc.	0	0		6	Fuel Gas to BRA Duct Heater
23-PSH-9024	No	0	2	in. wc.	0	0		1.2	Drum Dryer Air Heater
23-PSL-821	No	10	100	psi	0	0		70	BRA-DDYR-101 Steam Supply
23-PSL-822	No	10	100	psi	0	0		70	BRA-DDYR-102 Steam Supply
23-PSL-823	No	10	100	psi	0	0		70	BRA-DDYR-201 Steam Supply
23-PSL-9006	No	0	6	in. wc.	0	0		1	Fuel Gas to BRA Duct Heater
23-ST-854	No	400	2,660	Hz	4	20	mA		BRA-DDYR-101 Drum Dryer Motor Speed
23-ST-875	No	400	2,660	Hz	4	20	mA		BRA-DDYR-102 Drum Dryer Motor Speed
23-ST-906	No	400	2,660	Hz	4	20	mA		BRA-DDYR-201 Drum Dryer Motor Speed
23-SY-854	No	4	20	mA	3	15	psig		BRA-DDYR-101 Drum Dryer
23-SY-875	No	4	20	mA	3	15	psig		BRA-DDYR-102 Drum Dryer
23-SY-906	No	4	20	mA	3	15	psig		BRA-DDYR-201 Drum Dryer
23-TIT-832	No	100	400	°F	4	20	mA		Brine Heat Exchanger 101B Circulating Brine
23-TIT-890	No	100	400	°F	4	20	mA		BRA-HEAT-201B Circulating Brine
23-TR-832	No	4	20	mA	100	400	°F		Brine Heat Exchanger 101B Circulating Brine Temp Recorder

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
23-TR-890	No	4	20	mA	100	400	°F		BRA-HEAT-201B Circulating Brine Temp Recorder
23-TSH-724	No	0	500	°F	0	0		300	BRA-HEAT-201B Steam Supply
23-TSH-919	No	235	375	°F	0	0		300	BRA-HEAT-101B Steam Supply
23-TSL-271	No	-50	77	°F	0	0		40	BRA-HEAT-101 Sump Pump Sump Freeze Protection

Table F.2 BRA PAS Instrumentation in TOCDF Loveland Instrument Calibration Database

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
27-II-152	No	0	5	Amp	0	100	%		BRA-BLOW-102 Current
27-PDISH-143	No	4	20	mA	0	0		10.4	BRA-SEPA-101 Differential Pressure
27-PDISH-144	No	4	20	mA	0	0		10.4	BRA-SEPA-102 Differential Pressure
27-PDISH-145	No	4	20	mA	0	0		10.4	BRA-SEPA-103 Differential Pressure
27-PDISH-186	No	4	20	mA	0	0		10.4	BRA-SEPA-104 Differential Pressure
27-PDISHH-143	No	4	20	mA	0	0		15.2	BRA-SEPA-101 Differential Pressure
27-PDISHH-144	No	4	20	mA	0	0		15.2	BRA-SEPA-102 Differential Pressure
27-PDISHH-145	No	4	20	mA	0	0		15.2	BRA-SEPA-103 Differential Pressure
27-PDISHH-186	No	4	20	mA	0	0		15.2	BRA-SEPA-104 Differential Pressure
27-PDSLL-143	Yes	4	20	mA	0	0		5.6	BRA-SEPA-101 Differential Pressure
27-PDSLL-144	Yes	4	20	mA	0	0		4.4	BRA-SEPA-102 Differential Pressure
27-PDSLL-145	Yes	4	20	mA	0	0		4.4	BRA-SEPA-103 Differential Pressure
27-PDSLL-186	Yes	4	20	mA	0	0		5.6	BRA-SEPA-104 Differential Pressure
27-PDT-143	Yes	0	10	in. wc.	4	20	mA		BRA-SEPA-101 Differential Pressure
27-PDT-144	Yes	0	10	in. wc.	4	20	mA		BRA-SEPA-102 Differential Pressure
27-PDT-145	Yes	0	10	in. wc.	4	20	mA		BRA-SEPA-103 Differential Pressure
27-PDT-186	Yes	0	10	in. wc.	4	20	mA		BRA-SEPA-104 Differential Pressure
27-PIT-300	No	0	250	in. wc.	4	20	mA		BRA-BURN-110 Fuel Gas Supply
27-PSH-302	No	0	10	psi	0	0		5	BRA-BURN-110 Fuel Gas Supply
27-PSHH-328	No	-15	0	in. wc.	0	0		-1	BRA PAS Baghouse Inlet
27-PSL-300	No	0	5	psi	0	0		3	BRA-BURN-110 Fuel Gas Supply

Table F.2 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
27-PSL-306	No	0	5	psi	0	0		3	BRA-BLOW-101 Disch. Pressure
27-TISH-152A	No	0	200	°C	0	0		155	BRA-BLOW-102 Motor Temperature
27-TISH-152B	No	0	200	°C	0	0		155	BRA-BLOW-102 Motor Temperature
27-TISH-152C	No	0	200	°C	0	0		155	BRA-BLOW-102 Motor Temperature
27-TISH-168	No	0	500	°F	0	0		285	BRA PAS Burner Exhaust Temp.
27-TISH-172	Yes	4	20	mA	0	0		15	BRA PAS Baghouse Inlet Temperature
27-TISL-103	No	4	20	mA	0	0		14	BRA-SEPA-101 Temperature
27-TISL-104	No	4	20	mA	0	0		14	BRA-SEPA-102 Temperature
27-TISL-105	No	4	20	mA	0	0		14	BRA-SEPA-103 Temperature
27-TISL-106	No	4	20	mA	0	0		14	BRA-SEPA-104 Temperature
27-TISL-172	Yes	4	20	mA	0	0		14.2	BRA PAS Baghouse Inlet Temperature
27-TISL-190	No	4	20	mA	0	0		11.6	BRA-SEPA-105 Temperature
27-TISLL-103	No	4	20	mA	0	0		13	BRA-SEPA-101 Temperature
27-TISLL-104	No	4	20	mA	0	0		13	BRA-SEPA-102 Temperature
27-TISLL-105	No	4	20	mA	0	0		13	BRA-SEPA-103 Temperature
27-TISLL-106	No	4	20	mA	0	0		13	BRA-SEPA-104 Temperature
27-TISLL-190	No	4	20	mA	0	0		7.6	BRA-SEPA-105 Temperature
27-TSHH-172	Yes	4	20	mA	0	0		15	BRA PAS Baghouse Inlet Temperature
27-TT-103	No	0	400	°F	4	20	mA		BRA-SEPA-101 Temperature
27-TT-104	No	0	400	°F	4	20	mA		BRA-SEPA-102 Temperature
27-TT-105	No	0	400	°F	4	20	mA		BRA-SEPA-103 Temperature

Table F.2 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
27-TT-106	No	0	400	°F	4	20	mA		BRA-SEPA-104 Temperature
27-TT-172	No	0	400	°F	4	20	mA		BRA PAS Baghouse Inlet Temperature
27-TT-190	No	0	400	°F	4	20	mA		BRA-SEPA-105 Temperature

APPENDIX G

Intercontroller Communications

BRA operations are controlled in-part by PLC, ICS-CONR-108. No intercontroller communications are provided for drum dryer heated air, BRA PAS burner, and BRA PAS, which are controlled by local, vendor-supplied PLCs. Table G.1 lists the digital intercontroller inputs and outputs (DICIs/DICOs) of ICS-CONR-108. The DICIs/DICOs listed are based on the TOCDF code as of September 2001 and UMCDF code as of January 2002. ANCDF code is also available, but since they do not plan to operate the BRA, the ANCDF DICIs/DICOs are not included (see FAWB Note B-5).

Table G.1 TOCDF and UMCDF BRA ICS-CONR-108 DICIs/DICOs

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
101A	023	123	108	051	00	Process Water System Running		Running	0
104A	023	123	108	063	00	Process Water System Running		Running	0
105	023	123	108	067	00	Process Water System Running		Running	0
106	023	123	108	069	00	(TE only) 26-LSHH-077 SDS-TANK-104 High High		Level High-High	0
106	023	123	108	069	00	(UM only) Lab Waste Pump Running		Running	0
108	005	105	102	073	00	Agent Alarm from CON	Alarm	OK	0
108	017	117	105	073	00	(UM only) Plant Air Available		Available	0
108	017	117	105	073	00	(UM only) BRA PAS Baghouse Air Shedding Valve 27-HV-154		Closed	0
108	019	119	106	073	00	(UM only) Inhibit Lab Waste Pumps		Inhibit	0
108	025	125	109	073	00	(UM only) Elec. System OK		Normal	0
108	025	125	109	073	01	Elec. System Power Loss		Power Loss	0
108	025	125	109	073	02	Start Essential Power Equip.		Start	0
109	023	123	108	075	00	PRW-PUMP-101 Running		Running	0
109	023	123	108	075	01	PRW-PUMP-103 Running		Running	0

Table G.1 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
109	023	123	108	075	02	(UM only) PRW-PUMP-102 Running		Running	0
110	023	123	108	077	00	Process Water System Running		Running	0
110	024	124	108	078	00	Screen D08 Diagnostic Adv. Alarm			0
110	024	124	108	078	01	Screen D08 Diagnostic Adv. Unack.			0
111	023	123	108	079	00	Process Water System Running		Running	0
112	023	123	108	081	00	Process Water System Running		Running	0
112	023	123	108	081	01	BRA Tanks not Hi-Hi Lvl or Selected	Alarm	OK	0
112	023	123	108	081	02	ACAMS Not Online, Timed Out		Alarm	0
113	023	123	108	083	00	Process Water System Running		Running	0
113	023	123	108	083	01	Waste Water Treatment Common Alarm	Alarm	OK	0
113	023	123	108	083	02	BRA Tanks not Hi-Hi Lvl or Selected	Alarm	OK	0
114	023	123	108	085	00	Process Water System Running		Running	0
114	023	123	108	085	01	BRA Tanks not Hi-Hi Lvl or Selected	Alarm	OK	0
119	023	123	108	091	00	Process Water System Running		Running	0
119	023	123	108	091	01	BRA Tanks not Hi-Hi Lvl or Selected	Alarm	OK	0
119	024	124	108	092	00	BRA-Tank-101/102/201/202 not Hi Level	Alarm	OK	0
120	023	123	108	093	00	(UM only) ACAMS not online, timed out		Timed Out	0

APPENDIX H

References

PROGRAMMATIC

CSDP Control Systems Software Design Guide, Revision 19, 3-12-93.

Programmatic Process FAWB Maintenance Plan, Revision 0, 12-8-98.

ANCDF (through ECP ANEC1312PFS, September 2001)

ANCDF Control System Source Code, November 2001

AN-2-D-501, Rev. 7, 6-22-01	Brine Surge Tanks and Pumps, P&ID
AN-2-D-502, Rev. 6, 6-22-01	BRA Evaporator, P&ID
AN-2-D-503, Rev. 6, 6-22-01	BRA Drum Dryer, P&ID
AN-2-D-504, Rev. 5, 6-22-01	BRA Drum Dryer, P&ID
AN-2-D-505, Rev. 4, 10-2-98	BRA PAS Burner and Manifold, P&ID
AN-2-D-507, Rev. 1, 5-8-98	Heater and Manifold, P&ID
AN-16-D-005, Rev.4, 6-22-01	Water Treatment System, P&ID
AN-27-D-501/1, Rev. 4, 10-2-98	BRA PAS Baghouses, P&ID
AN-27-D-501/2, Rev. 4, 10-2-98	BRA PAS Baghouses, P&ID
AN-27-D-502, Rev. 5, 10-2-98	BRA PAS Blower and Stack, P&ID
AN-2-E-2, Rev. 5, 10-2-98	El 112’0” Area 2-1, Partial Lighting Plan
AN-2-E-512, Rev. 2, 10-2-98	Local Control Panel ICS-PANL-104, Schematic Diagram
AN-2-E-513, Rev. 1, 10-2-98	Local Control Panel ICS-PANL-104, Schematic Diagram
AN-2-E-515, Rev. 2, 10-2-98	Local Control Panel ICS-PANL-104, Schematic Diagram
AN-2-E-902, Rev. 5, 8-10-01	SPS-MCC-113 480V MCC-PUB No.1, Single Line Diagram
AN-2-E-903, Rev. 7, 8-10-01	SPS-MCC-114 480V MCC-PUB No.2, Single Line Diagram
AN-27-E-502, Rev. 3, 10-2-98	Areas 27-2, Electrical Plan
AN-2-F-501, Rev.8, 6-22-01	Brine Reduction Area (BRA) Train, PFD
AN-2-F-505, Rev.2, 6-22-01	BRA and BCS Max-Min Tables, PFD

PBCDF (through Fast Track 11, November 2001)

PB-2-D-501, Rev. 10, 9-7-01	Brine Surge Tanks and Pumps, P&ID
PB-2-D-502, Rev. 6, 1-24-01	BRA Evaporator, P&ID
PB-2-D-503, Rev. 5, 1-24-01	BRA Drum Dryer, P&ID

PBCDF (cont'd)

PB-2-D-504, Rev. 4, 1-24-01	BRA Drum Dryer, P&ID
PB-2-D-505, Rev. 3, 1-24-01	BRA PAS Burner and Manifold, P&ID
PB-2-D-507, Rev. 1, 7-10-98	Heater and Manifold, P&ID
PB-2-D-508, Rev. 1, 9-7-01	Brine Loading, P&ID
PB-16-D-005, Rev. 5, 1-24-01	Water Treatment System, P&ID
PB-27-D-501, Rev. 5, 1-24-01	BRA PAS Baghouses, P&ID
PB-27-D-502, Rev. 5, 1-24-01	BRA PAS Blower and Stack, P&ID
PB-27-D-503, Rev. 5, 1-24-01	BRA PAS Baghouse, P&ID
PB-2-E-2, Rev. 4, 6-29-01	El 112'0" Area 2-1, Partial Lighting Plan & Panel Schedules
PB-2-E-512, Rev. 2, 7-10-98	Local Control Panel ICS-PANL-104, Schematic Diagram
PB-2-E-513, Rev. 2, 7-10-98	Local Control Panel ICS-PANL-104, Schematic Diagram
PB-2-E-515, Rev. 1, 7-10-98	Local Control Panel ICS-PANL-104, Schematic Diagram
PB-2-E-902, Rev. 6, 9-7-01	SPS-MCC-113 480V MCC, Single Line Diagram
PB-2-E-903, Rev. 5, 6-29-01	SPS-MCC-114 480V MCC, Single Line Diagram
PB-27-E-502, Rev. 1, 7-10-98	BRA PAS Area 27-2, Electrical Plan
PB-2-F-501, Rev.5, 9-7-01	Brine Reduction Area (BRA) Train, PFD
2-EVP-018A-M-002 Rev 2, 1-9-98	Brine Evaporator, P&ID (vendor drawing)

TOCDF

TOCDF Functional Analysis Workbook, Section III, Chapter 5.23, Brine Reduction Area, Rev. 2, May 5, 1998.

TOCDF Control System Source Code, September 2001.

TOCDF Control System Source Code, May 1998 (used only for Appendix E operator screens).

TOCDF Loveland Instrument Calibration Database, August 2000.

TOCDF Standing Operating Procedure, BRA PAS Startup, Operation, and Shutdown, TE-SOP-111, Rev. 0, Change 8, May 1, 1998.

TOCDF Standing Operating Procedure, BRA-TANK-101 & 102 (201 & 202) Startup, Evaporator 101 (201) Startup, Operation, and Shutdown, TE-SOP-026, Rev. 2, Change 2, April 10, 1998.

TOCDF Standing Operating Procedure, Drum Dryer Start Up, Operation, and Shutdown, TE-SOP-028, Rev. 1, Change 4, May 13, 1998.

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EG-2-D-102, Rev.3, 7-5-01	Brine Loading, P&ID
TE-2-D-501, Rev.23, 4-27-00	BRA Surge Tank and Pumps - Line 1, P&ID
TE-2-D-502, Rev.19, 7-24-98	BRA Evaporator - Line 1, P&ID
TE-2-D-503, Rev.18, 7-24-98	BRA Drum Dryer - 101, P&ID
TE-2-D-504, Rev.18, 7-24-98	BRA Drum Dryer - 102, P&ID
TE-2-D-505, Rev.18, 6-23-98	BRA PAS Burner and Manifold, P&ID
TE-2-D-511, Rev.24, 4-27-00	BRA Surge Tank and Pumps - Line 2, P&ID
TE-2-D-512, Rev.17, 3-10-98	BRA Evaporator - Line 2, P&ID
TE-2-D-513, Rev.19, 7-24-98	BRA Drum Dryer – 201, P&ID
TE-16-D-005, Rev. 5, 9-13-00	Water Treatment System, P&ID
TE-27-D-501/1, Rev.13, 2-4-98	BRA PAS Baghouses, P&ID
TE-27-D-501/2, Rev.12, 12-3-97	BRA PAS Baghouses, P&ID
TE-27-D-502, Rev.16, 2-19-98	BRA PAS Blower and Stack, P&ID
EG-02-E-0001, Rev. 0, 12-17-97	BRA-MCC-101, 102, and 201, Single Line Diagram
TE-2-E-901, Rev.14, 3-24-98	SPS-SWGR-103/104, 480V Switchgear, Single Line Diagram
TE-2-E-902, Rev.18, 8-12-98	SPS-MCC-113, 480V MCC-PUB No.1, Single Line Diagram
TE-2-E-903, Rev.19, 1-22-98	SPS-MCC-114, 480V MCC-PUB No. 2, Single Line Diagram
TE-27-E-501, Rev.4, 11-7-95	BRA PAS Area 27, Electrical Plan
TE-2-F-501, Rev.12, 9-19-96	Brine Reduction Area (BRA) First Train, PFD
TE-2-F-502, Rev.12, 9-19-96	Brine Reduction Area (BRA) Second Train, PFD

UMCDF (through Design Packages CCP-0178, CP1022, CP0982, CP0992, and ECP UM981)

UMCDF Control System Source Code, January 2002.

UM-2-D-501, Rev. 9, 8-23-00	Brine Surge Tanks and Pumps - Line 1, P&ID
UM-2-D-502, Rev. 5, 8-23-00	BRA Evaporator - Line 1, P&ID
UM-2-D-503, Rev. 5, 8-23-00	BRA Drum Dryer - Line 1, P&ID
UM-2-D-504, Rev. 5, 8-23-00	BRA Drum Dryer - Line 1, P&ID
UM-2-D-505, Rev. 5, 10-17-01	BRA PAS Burner and Manifold, P&ID
UM-2-D-507, Rev. 3, 8-23-00	Heater and Manifold, P&ID
UM-2-D-511, Rev. 8, 8-23-00	Brine Surge Tanks and Pumps - Line 2, P&ID
UM-2-D-512, Rev. 4, 8-23-00	BRA Evaporator - Line 2, P&ID
UM-2-D-513, Rev. 5, 8-23-00	BRA Drum Dryer - Line 2, P&ID
UM-16-D-005, Rev. 3, 3-5-99	Water Treatment System, P&ID
UM-27-D-501/1, Rev. 7, 8-23-00	BRA PAS Baghouses, P&ID
UM-27-D-501/2, Rev. 5, 8-23-00	BRA PAS Baghouses, P&ID
UM-27-D-502, Rev. 5, 8-23-00	BRA PAS Blower and Stack, P&ID
UM-2-E-8, Rev. 7, 4-20-01	El 114'10" Area 2-1, Partial Lighting Plan

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UM-2-E-507/1, Rev. 2, 7-5-00	Local Control Panel ICS-PANL-104, Schematic Diagram
UM-2-E-507/2, Rev. 2, 7-5-00	Local Control Panel ICS-PANL-104, Schematic Diagram
UM-2-E-507/3, Rev. 1, 6-5-98	Local Control Panel ICS-PANL-104, Schematic Diagram
UM-2-E-508/1, Rev. 2, 7-5-00	Local Control Panel ICS-PANL-111, Schematic Diagram
UM-2-E-508/2, Rev. 2, 7-5-00	Local Control Panel ICS-PANL-111, Schematic Diagram
UM-2-E-508/3, Rev. 1, 6-5-98	Local Control Panel ICS-PANL-111, Schematic Diagram
UM-2-E-901, Rev.0, 1-30-97	SPS-SWGR-103/104, 480V Switchgear, Single Line Diagram
UM-2-E-902, Rev. 4, 8-21-98	SPS-MCC-113 480V, Single Line Diagram
UM-2-E-903, Rev. 5, 8-21-98	SPS-MCC-114 480V, Single Line Diagram
UM-27-E-502, Rev. 2, 4-17-98	BRA PAS Area 27-1, Electrical Plan
UM-2-F-501, Rev. 6, 10-17-01	Brine Reduction Area (BRA) First Train, PFD
UM-2-F-502, Rev. 6, 10-17-01	Brine Reduction Area (BRA) Second Train, PFD